THE FOUNDRY

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A Well-Deserved Compliment.

In all probability if a vote could be taken of the leading expert foundrymen of this country as to who in their opinion was entitled to precedence as the premier foundryman of America, there would hardly be a moment's doubt as to the unanimous nomination of Mr. D. J. Matlack of Philadelphia for this honor, which in this country, noted for its skilled mechanics and engineers, would at once make any man who might occupy such a position, a prominent figure.

But in conferring such a title upon Mr. Matlack, those who might participate would realize that they were themselves honored by having among them a man who had successfully solved foundry problems of the first magnitude, and who has had charge of the making of castings that have been the admiration of thousands of his fellow mechanics.

Mr. Matlack, on March 4, celebrated the 50th anniversary of his employment with the I. P. Morris Co., Philadelphia, which afterwards became a portion of the Cramps Shipbuilding Co.

Upon this occasion Mr. E. S. Cramp, realizing the unusual character of the event, and as an evidence of the appreciation the company had of Mr. Matlack's long service and skill, tendered to him, at the Bellevue hotel, in Philadelphia, a banquet that was noteworthy not alone because of the unique occasion, but also as having brought together a number of the most eminent engineers in America, whose occupation had thrown them more or less closely into contact with the guest of honor of the evening.

D. J. MATLACK.

Among those present were:

J. D. Spreckles, so well known as the great sugar manufacturer of California and the Hawaiian Islands.

Chief Engineer W. S. Moore, U. S. N., now in charge of the battleship Maine now building at Cramps.

J. H. Mull, superintendent of the building and installing of engines at the company's ship yards.

H. W. Hand, assistant superintendent of the Cramp Co.

Geo. S. Webster, engineer in charge of designing and building the subway in Philadelphia.

E. D. Levitt, well known in both Europe and America as one of this country's foremost engineers and designers.

John Fritz of the Bethlehem Steel Co. and ex-president of the American Society Mechanical Engineers.

Henry W. Cramp, vice-president and treasurer of the William Cramp Sons.

Jas. S. Doran, the chief engineer of the American line of steamships, and under whose supervision the St. Louis and St. Paul were built.

Francis L. Cramp, superintendent of hull construction at the ship yards.

F. E. Kirby of the Detroit Dry-Dock Shipbuilding Co.

John Hartman, an expert on blast furnaces.

James S. Christie, the engineer in charge of the noted Pencoyd Iron Works.

Geo. S. Graham, U. S. district attorney of Philadelphia.

G. S. Melville, U. S. N., president of the American Society Mechanical Engineers, and chief engineer of the navy, under whose supervision the present new navy was constructed.

Wm. H. Glockler, a well-known engineer, associated with E. D. Levitt.

N. P. Towne, formerly chief engineer of the U. S. navy and now chief engineer at Wm. Cramp & Sons' Co. Mr. Towne it was who designed the famous Oregon and Iowa.

Samuel W. Vauclain, superintendent of the Baldwin Locomotive Works.

James Snow, president of the Snow Steam Pump Co. at Buffalo, N. Y.

Dr. Coleman Sellers, engineer-in-chief with the Niagara Falls Power Co., and formerly with Wm. Sellers & Co., Philadelphia.

R. B. Baker, president of the Sterling Coal Co.

John T. Morris, James P. Thompson and Wm. P. Thomas, formerly president, treasurer, secretary and superintendent, respecively, of the I. P. Morris Co.

H. J. Hartley, president of the Boilermakers' association.

Geo. C. Matlack, son of D. J. Matlack, and his father's assistant in the foundry departments.

Chas. H. Cramp, president of the Wm. Cramp & Sons Co., and E. S. Cramp, the gentleman who gave the dinner, were also present.

A more distinguished company it would be hard to conceive or get together.

The gentlemen present were not conspicuous because of wealth, political position, or social standing alone, but they represented all that was best in the field of American mechanics, and the highest development of American industrial progress.

A glance at the names would, of course, naturally be sufficient to at once indicate the esteem in which Mr. Matlack was held, but as if that were not sufficient, the speeches of the evening were of such a character as to emphasize the fact that Mr. Matlack had not only created for himself a niche in the temple of fame, but had succeeded in very satisfactorily filling it.

Nearly all those present joined in praising him, not only for his skill, knowledge and success as a foundry manager, but for the sterling qualities of his character and worth as a friend.

Many of those present had come hundreds of miles to be present at the occasion, thus showing their appreciation of the significance and propriety of the event.

A couple of pages of the menu were reserved for the autographs of those present, and it can be easily seen from the foregoing names that it would be an interesting collection.

THE FOUNDRY desires to join in extending its congratulations and expresses the hope that Mr. Matlack may continue for many years to add to his own reputation, that of his business associates, and the reputation of the great company with which he is associated, in turning out a class of work not excelled if equalled on the western hemisphere.

Mr. Matlack was born in Philadelphia in September, 1833, and is therefore about 65 years old. He entered the old-established firm of I. P. Morris & Co. as an apprentice,

in February, 1849, and after serving his apprenticeship remained there as a journeyman, being made foreman in 1863, and a member of the firm in 1875, and he is today one of the foremost among America's mechanical engineers. Mr. Matlack is a member of the American Society of Mechanical engineers, and he is well entitled to the distinction because of the extraordinary genius he has displayed in the prosecution of his life-work. No man with less than the very highest order of ability could hold so responsible a position with such a firm as the Cramps. In the foundry under Mr. Matlack's charge is produced the heaviest class of castings, such as mining engines and machinery, engines and machinery for merchant ships, and for the huge leviathans of our navy, requiring executive and practical ability of the first class, in order to the production of work that cannot be excelled, if equaled, in the world.

In a word, Mr. Matlack has won the proud distinction of being, easily, the equal of any foundryman of his day and age, and hosts of his fellow-foundrymen who have never had the pleasure of his acquaintance, and all who know him, whatever their vocation in life, will join in wishing him many added years of happiness as a fitting crown to his useful life.

Ordnance Work.

MAKING A ROLLER PATH IN LOAM.

BY JAMES A. MURPHY.

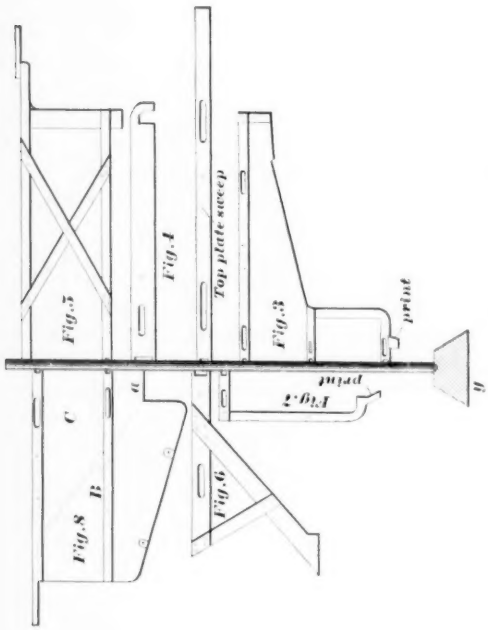
The making of massive castings has always been a fruitful theme among those interested in the art of molding, and many are the grossly exaggerated, and often comic yarns spun before the bar in some "corner paradise" where the golden cup is quaffed, and where those elegant dreams of mechanical science, in relation, exhausts the vocabulary of the most brilliant "star" at the business. The imagination has to be drawn on for a good yarn, for, something as thick as a London fog must have shrouded the minds of ancient and modern historians alike, and prevented them from recording the achievements of those whose lives were spent in developing and perfecting the greatest industrial art of all ages. Biblical literature, in its meager reference to the art of molding and founding, mentions as the first molder, Tubal Cain; and the first work worthy of mention was performed by Hiram of Tyre, who made the great pillars of Solomon's famous temple. From measuresments, given in cubits, it appears that each of these columns weighed approximately 150 tons; and they were cast in brass. Hiram's record has often been beaten, for, we are told of castings of almost inconceivable size and weight, made in an hour or two, by some happy-go-lucky group of molders, while they rush the foaming can, and, in forceful language, consign the prohibitionist to a far warmer place than the foundry.

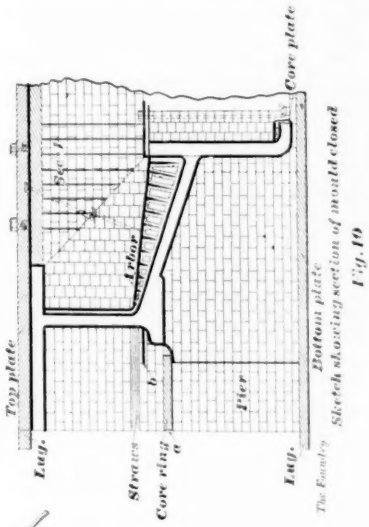
The largest castings that I ever saw were made in bar-rooms; the one which is the principal topic of this article, however, was made in a foundry, and it needed no props up against the roof to keep it from straining, neither had a man to ride around on a fiery steed, with flaming torch in hand to light the vent. Indeed, it does not require much study of the accompanying drawings to see that there is nothing so very intricate about the piece; indeed, it presents no special difficulty to the molder, and will be interesting only to such as are unfamiliar with loam work, or to those who have not had experience in making heavy, or large castings in either green sand or loam. It is a long time since I made this casting, and I do not remember its exact dimensions. I know, however, that its greatest diameter was about 13 feet, and that it weighed about 20 tons. It was made at the Watertown arsenal, under the supervision of the able ordnance expert, Maj. J. W. Reile.

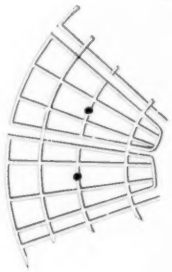
Figs. 1 and 2 are the plan and elevation 3, 4, 5, 6, 7 and 8, the sweeps, and 9, the core arbor.

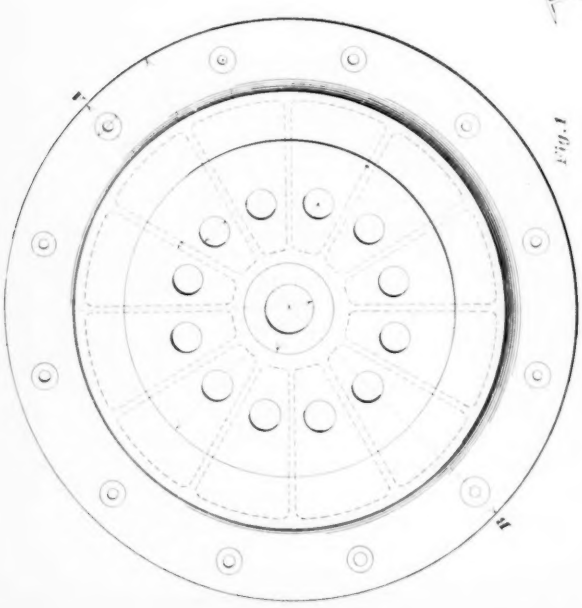
The first requirement for the making of this job is a bottom-plate heavy enough to carry the whole of the mold without springing, or cracking it. As the diameter of the casting is to be 13 feet, it will be necessary to level a large bed on the foundry floor, and, with the aid of the trammels, inscribe a circle with a radius at least 10 inches greater than that of the casting required, in order to carry the cope ring, taking care to allow for shrinkage of ⅛ inch to the foot. Have a piece of wood cut to your radius by the carpenter, place it on the line and ram up outside of it to a distance of about four inches, following round till the circle is completed. From the same center scribe a smaller circle for the cylinder to go through, and to facilitate the bolting of the mold together

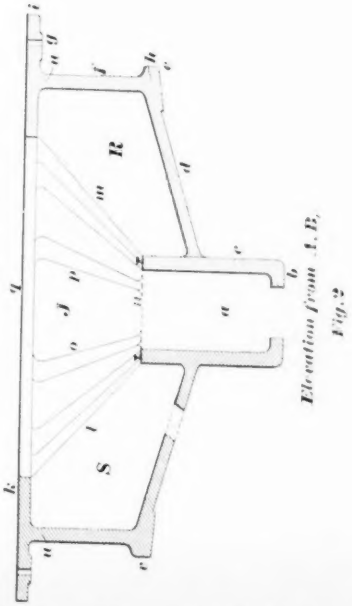
after it is finished. Care should be taken not to make this hole too large, as the plate must form a seat for the core, A. Having rammed up inside the inner circle, draw transverse diameters, and, where the lines cut the outer circle, locate the lifting lugs. These can be formed by a suitable block, or by a couple of bricks. A somewhat quicker











way, and one often used, is to draw all lines before ramming up any section, and form the lugs in their proper places. After building the runners, the bottom-plate mold is ready to pour. Be careful to have enough iron at hand to nearly fill the mold. Bricks or cores may be placed to take out weight, and the holes thus formed will greatly facilitate the drying of the mold.

To begin the mold, we level up a place for this bottom-plate, either with sand, or it may be set on large blocks. Now, set the spindle, to which attach the sweep, Fig. 3, which is to form the lines B, C, D, E, Fig. 2. In building up to this sweep, care must be taken to have the brick work very open, and with the exception of the course next the sweep, very little mud should be used; cinders, and dry sand from the floor being rammed solidly between the brick elsewhere, thus facilitating the drying process, and permitting the gases to escape easily. When all is built up to the point E, sweep Fig. 3 is removed, and Fig. 4 is attached. This is to form the block, H, around the mold so that the side, or cheek, F, can be built above it, as, in loam molding it is very desirable to dispense as much as possible with under sweeping. When the block, H, is finished up nice and smooth, apply a coat of oil and parting sand. Now, place the cope-ring, (a, Fig. 10). Some molders make the cope-ring-seating on the bottom-plate, with a joint tapering to E, which involves a lot of work that it is desirable to avoid. A much better plan is to build a sufficient number of piers from the bottom-plate to the point, E, and on these piers set the cope-ring. After building to the top of the block, H, it will be necessary to have a light cast iron arbor or ring, to set on the brick work, the inner edge of which should approach to within ¾ inch to the line, F, (see b, Fig. 10). Now, attach sweep, Fig. 5, and on top of the plate, and over H, build up the lines F, G, I. After the different coats of loam have been put on, and the slip has been applied, to give it a smoother face, this much of the mold is ready to be taken apart and finished.

Now, the core, A, is swept up with the sweep, Fig. 7, and gotten ready to go in the oven. While the bottom core and cope are in the oven, we can be making the top plate and the top part of the mold.

Some molders would make the top plate all in one piece, which, in many instances is the better plan; but in some cases the prickers are required to be so long that it is hard to get a good plate, and the prickers get broken off, thus rendering the plate almost worthless. In the present case we will make the section J, Fig. 2, within the lines l, m, n, o, p and q, which will give us a ring with a hole equal to J, in the center. In this ring we can cast prickers of various lengths required, to meet the lines above mentioned, care being taken that holes be left in the proper places through which to fasten the cores R, S, and hooks placed by which to bolt them to the top plate. It can be swept up with the sweep, Fig. 6, and the top plate K, with a plain straight edge.

Now, the cores are yet to be made. The best, quickest and safest way to make them is to use a sweep like Fig. 8; and if there is an old plate anywhere about, set it up, and, attaching sweep S, to a spindle, build a circular core box to conform to the lines of the sweep. As there are 12 cores, one-half the length of your radius will exactly bisect the outer circle. Then, with the aid of a central straight edge, draw lines from center to outer circle, and, by using a plumb bob, get the lines on in their proper places. Now have some planks cut the thickness of the arms required, and in shape like part B, of sweep, Fig. 8. (The dotted line in this figure divides parts B and C.) The arbor next requires our attention, and, in order to have all the cores firm, and the arms of equal thickness, it is best to have the various sections connected, as at x x x x x x, Fig. 9. As this arbor sets level in the core box, the prickers must project down, to carry the under weight, and some rods must be stuck in the outer circle to carry, support and give strength to the core.

An inch nut, or a staple should be cast in each section from which to bolt the core to the top plate. Set the arbor in the core box and place pieces B, Fig. 8, in their respective positions, and build the core, taking care to have center very open, and also leave room to screw in a rod for bolting purposes. The top of cores are swept to shape by part C, Fig. 8. When the cores are all built and set, the outer walls of the core box can be thrown down, the cores dressed and blackened while green, the whole lot lifted on the plate and placed in the oven to dry.

When properly dried, the part J can be turned over and lowered down on the cores, and firmly bolted thereto. The top plate can

then be turned over and lowered down upon them and firmly bolted. Then the whole lot can be lifted, and the bottom blackened. The round cores are now set in place, and the whole top plate, with cores attached, is ready to be closed on, as by this time the bottom and cope are together, and in the pit. The closing is accomplished by use of the sling and cross. The sides are now solidly rammed up, and the runners built on top. The pouring gates are set on the circle T T and four good-sized risers should be placed on U U; these will need churning.

It is best to melt the iron for this casting in the air furnace, though the cupola can be used, by the aid of large ladles and reservoir. The air furnace is best and safest, however, and gives the best satisfaction as to uniformity of strength, and grade of iron.

It may be well to state here that these cores may be made separately, but, thus made, they are not nearly so strong, to resist the great pressure of iron, without the aid of many studs and chaplets, something to be avoided in all castings so far as possible.

I have omitted the numerous smaller details of molding such a piece as this, because they will be, no doubt, familiar to all practical founders.

The projection at G, Fig. 2, is only a round disc, and does not follow round the casting. That at V, is, after being cast solid, cut into a spur gear, by which the casting is turned when in position.

The accompanying figures are not drawn to scale, as I have forgotten the proper dimensions. But, as the shape of the casting is retained in my mind, the drawings are a reproduction from memory. The shape is exact, however, and I earnestly hope it will be of as much benefit to my fellow craftsmen as if it were drawn to scale.

Setting Gaggers.

BY P. R. RAMP.

The use of the gagger is supposed to be generally understood by molders, yet many do not use them intelligently.

A gagger, or sand hook, as some molders call it, is shaped like the letter L, (Fig. 1) the shank, A, being about twice the length of the heel, B, these proportions varying according to requirements. When made in cast iron, the patterns may be fixed on a board, as at Fig. 2, and made in open sand. The sizes mostly in use are, shank, about 7 inches long; heel, about 4½; special sizes being made to suit. Wrought gaggers are preferred for heavy work, as the cast one is so easily broken. The setting of the gaggers in the mold just right is an important operation wherein many fail to use good judgment. Instead of setting the gagger snugly against the bar as at A, Fig. 3, they stand them in a leaning position, as at B, which reduces its lifting capacity by at least one-half.

Fig. 3 shows the interior of a flask of center bearings, ready to pour. C represents the cope, D the drag, E the bars, F the gaggers, G the gate, and H the molds. Observe the difference in positions of the gaggers at A, and at B. A glance will suffice to decide which is preferable.

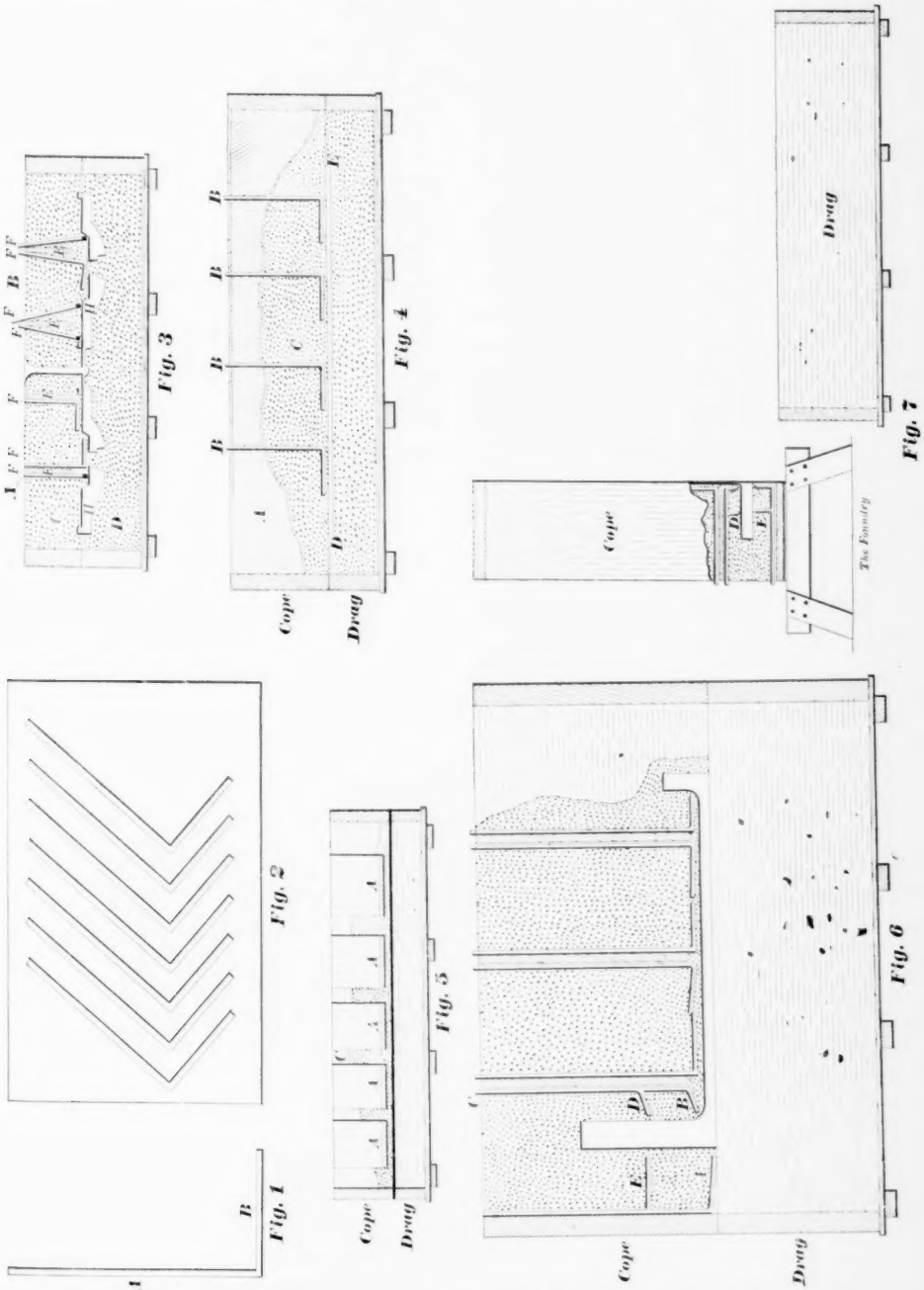
Before setting the gaggers they should be dipped in thin clay-wash. If the clay-wash be thick, too much of it will adhere to the gagger, and the excessive moisture, communicated to the sand, will be apt to cause a scab on the casting.

Fig. 4 shows the interior of a flask in which a plate pattern has been rammed up. The bars, one of which is shown at A, have been cut, or badly burned out. At B are seen the gaggers set in the cope to carry the body of sand below C. Observe what a slight grip these gaggers have in their bearing against the bar, in view of the great body of sand that they are expected to carry. If the sand between D and E does not drop out entirely, it will nevertheless be apt to sag down and cause the plate to be thin at the center.

The proper remedy for this case would be, ordinarily, a new set of bars; but, assuming that the bars of this cope have been cut to this shape for a regular job, we must get along without altering them for the sake of making a single casting. Therefore, it would be better to use wooden "soldiers," (see Fig. 5) which are short pieces of inch boards, chamfered at the bottom end, as at A, and set flat against the side of the cross-bar. B represents the soldiers in position against the bar, C. When ramming up the cope, clear the sand away from the top ends of the gaggers, so as to insure against hitting them with the rammer, for when this occurs the sand is packed so hard under them, if they stand over the pattern, as to necessitate scraping it off with the trowel, driving the gagger back, and patching the mold; and when the gagger is not over the

pattern, it is driven down into the drag, and an ugly job is the result, possibly an untrue joint, causing a "run-out," a lost casting or a burnt flask; besides, when a gagger is driven back, it is necessarily thereby loosened, and so rendered of little value in holding up the sand.

Fig. 6 is an interior view of a flask with a bracket rammed up in it. Frequently, in a mold like this, the molder will set gaggers as at A and B. When the cope is lifted, it is possible that these gaggers will serve to hold the sand; but in handling the cope, setting it off, leaning it back and forward, and



in lifting it to close on, it is necessarily more or less racked and twisted, and before it shall be finally closed back to place on the drag it will probably fall out at D; because there is nothing adequate to hold the sand at that point, when the cope is in the position as seen at Fig. 7. Hence, in a situation of this kind, there should be an extra row of gaggers set higher up in the cope, as at D and E, Fig. 6.

Casting a Power Press Frame.

BY R. H. PALMER.

The accompanying sketches are of a casting weighing some 4,000 lbs., made for the Mossberg & Granville Manufacturing Company, of Providence, R. I. It is their No. 5, style D, power press frame.

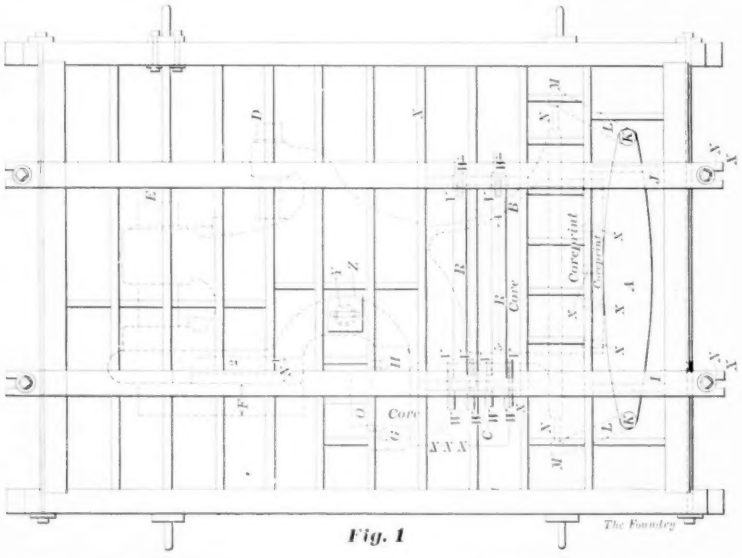


Fig. 1

Fig. 1 is a plan of the finished mold, with two binders running lengthwise the cope, the pouring basin, a, above all. The general outlines of the mold cavity, core prints, etc., are shown by the dotted lines. Fig. 2 is an elevation of the finished mold, the binders showing above the cope, and under the cleats of the bottom board, the backs of two clamps, wedged in position also appearing. The dotted lines here also show the mold cavity, the pouring gate, the riser, core prints, core, chaplets, several crossbars, etc. Figs. 3 and 4 show the finished casting.

In making this casting, the binders, L, Fig. 2, are first bedded in the floor, the top edges rising a little above the surface. They should be level both ways. Place the follow-board on the binders, with pattern in position, and cover the latter with a facing mixture composed of 6½ parts coarse molding sand to one of bituminous coal, ground to the fineness of gunpowder. Now, before you begin to ram up the drag, I wish to call your attention to something that many molders are too apt not to think of, and are consequently likely to get a badly scabbed casting, that, when the scabs are chipped off will look like a map of the world.

In Fig. 2, look at dotted line, C, and, following it around, till you come back to the starting point, you have the front of the core, while B, shows the back of core. Observe this line from 3, down to 4, and also imagine a line from 5 to 4, and you will see that we have a peculiar shape to ram up, and great care must be taken or we shall ram too hard in the shallow places. It is an easy thing to ram along side of a straight flange, but when ramming over a rapidly sloping surface, before we know it we shall be ramming too near the pattern if we do not keep our wits about us. Having rammed the mold to near the top edge of the base of the pattern, we will set the gates, as at N, Figs. 1 and 2. These gates are so tapered that they can be drawn into the mold after the pattern is withdrawn. The down-gates were set, big end down, on the follow-board, so soon as there was sand enough in the drag to hold them in position. They, of

course, connect with the branch gates above mentioned. One of the best ways to gate a mold of this kind is to make the gate in a core, which can be rammed up in the mold between the down gate and the pattern, and when the mold is being finished the gate has simply to be blown out.

After ramming up the drag, strike it off, and throw on loose sand as evenly as possible, then, with a man at each end of the

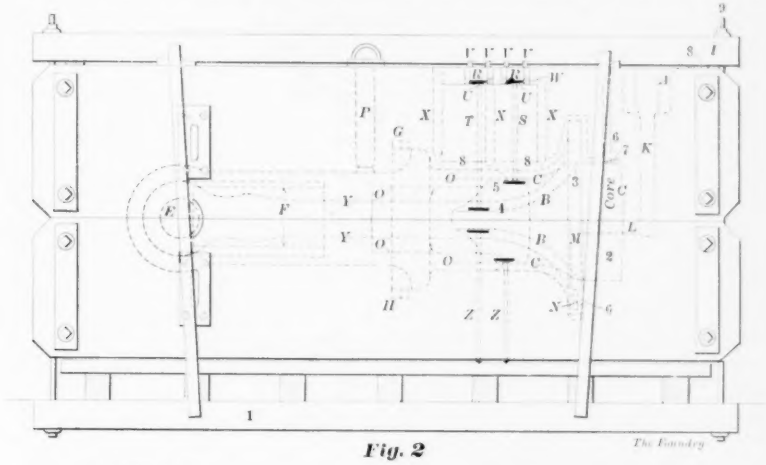


Fig. 2

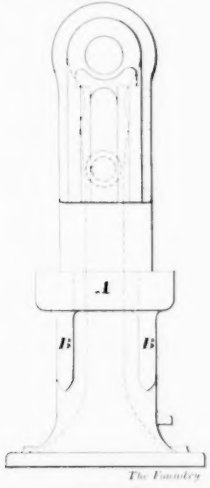


Fig. 3

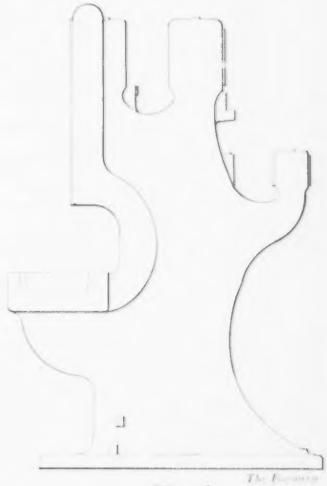


Fig. 4

strike, place a gagger between it and the top edge of the flask, and, sliding it along, level the loose sand. Now, put sand along the edge of flask, where the gagger has brushed it off, so as to have a full, level surface, and then rub the bottomboard down to a solid bed, lifting one edge again and again, to see that there be left no soft spots, but that all shall be solid and even. Then, with the corner of the strike, crease the bottom of mold in the usual way, and vent thoroughly, taking care not to stab the pattern, nor to run the wire down along the flange in such manner as to form a duct for a "run-out." Now, clamp the board on firmly and roll over, setting the drag on the binders, just as at the start. Having made the joint, the cope part of pattern is set in place, and cope lowered on. The down-gates are set as at K, Figs. 1 and 2. In ramming up the cope, remember, you have the same difficult lines to ram over as in the drag, and be careful, accordingly. The part of the cope back of the core print, between the bars dotted in under the binders, at I and J, Fig. 1, is not to be rammed up now, but must be left open. Having given the cope a good venting, hoist it off, roll over, make the joint and remove the pattern. Now look to see if there are any hard

spots, made from your having hit a gagger, accidentally, with the rammer. If any such hard places are found, remove the sand, and drive the gagger back a little, with the trowel, and fill in with sand again, making it compact, but not too hard. Having finished the drag, draw the gates, N, Figs. 1 and 2; also down-gates, M, M, Figs. 1 and 2. Now cut gates L, Figs. 1 and 2, to connect the down gates of cope and drag. We now drive chaplets z z, Fig. 2, for end of core to rest on. If the core is not level where the head of the chaplet comes, it must be made level. A gauge must be used for setting the chaplets, so as to insure the right thickness of iron. Set cores C and H, Fig. 1, E, Figs. 1 and 2, D, Fig. 1, and F, Figs. 1 and 2. Spikes must be driven in both cope and drag at 1 and 2, Fig. 1, to steady this latter core. To get an idea of the shape of core C, look at the line x x x, Fig. 1, and 0 0, Fig. 2, and remember that the space between the brackets B B, Fig. 3, is cored out, leaving a square space. Having finished setting the cores, see that all are firmly secured, using nails where needed. Before closing on the cope, swing it high enough so that you can get under and see that everything is all right. Now roll a worm of clay, and break off sections, a little longer than the thickness of the casting over the core, and set them on the core at the points where we wish chaplets T and S, Fig. 1, to bear. Now, with the trowel, cut a gash round the joint and run a line of parting sand in it so as to be sure of a close joint when the mold is finally closed. Now lower the cope to place, and be sure that it rests solidly on its proper bearing; then remove, and we shall find that the clay stools have marked the places where we wish to set the cope chaplets. Here, we punch holes, insert the chaplets, and pinch sand against them at the top, to keep them from falling out when the cope is closed on. Examining the joint closely, to see that there is no crush that needs repairing, the cope is closed on for the last time. Now, draw on the four clamps, the backs of two of which are shown in Fig. 2. After the clamps are fastened for good, push wedge, 7, Fig. 2, between the lower edge of cross-bar 6, and the top of core. Use iron wedges, not very thick. Lay pieces of rope from core vents to notches cut in the joint of flask, then shovel in some sand and ram up to top of core, then tuck sand around the wedges with your hand, after which fill up and ram to top of cope, then remove the ropes, to give vent to core. Build runner as shown at A, Figs. 1 and 2. You will perceive that chucks, marked 8 on bottom line, between bars x x x, Fig. 2, do not come to the top of the two outside bars marked x x, while the center bar, x, is just even with the chucks at the top, and the chaplets reach to the same level. When the cope was rammed up, only the two bars nearest the riser, P, were rammed full, the other bars being rammed to a level with the top of chucks. The binders, R R, Figs. 1 and 2, are now laid across the points of chaplets, and, to hold them up from the chaplets, wedges are inserted under the binders on top of the chucks. The long binders are now lowered upon rests on top of the cope, as at 8, Fig. 2. Bolts (see 9, Fig. 2) are now swung into the slots provided in the ends of the binders, and the nuts are screwed down tight. In Fig. 1, you will see where the ends of the short binders, R R, extend under the long binders. Now thrust wedges between the long and short binders, and also between the short binders and the upper ends of the chaplets, and the core will thus be secure. The other cores need only some paste to keep iron from running into the vent holes, and proper channels for escape of gas.

This piece can be bedded in the floor where desirable. Dig a hole somewhat longer than the binders and sink them therein, to the desired depth, fix the binding bolts in position, lay some plates on the binders, then ram some sand around the outside, after which, lay a cinder bed, ramming it down slightly, and, covering this with hay or straw, ram a sufficient depth of sand above it, say, 4 or 5 inches. Now block up the drag part of pattern in position and weight it down. Tuck and ram under it, remove the pattern and vent down to the cinder bed, then spread facing sand over the mold as evenly as possible, return the pattern and carefully rap it down. Now, carefully ram up to the joint.

If you intend to weight this cope down, instead of using binders, be careful to provide against crushing, by building up under the ends of binders, and insert wedges between the binders and cross-bars after the weights are on. And where the binders are used, great care must be taken to prevent

crushing. Bear in mind also to provide for a secure seat for the chaplets in the bottom of the mold, as we have no bottom-board in this case.

Figs. 3 and 4 show the finished casting, ready for shipment.

Dividing the Authority.

A CHEMIST'S POSITION IN A FOUNDRY.

BY E. C. WHEELER.

There has been considerable discussion of late upon the question of the status of the chemist in the foundry, and as the topic is one upon which opinions vary radically, the result has been in some instances to curtail the scope of the chemists 'endeavors, and of his possibilities. Whether this condition has been brought about by a feeling of distrust following the results of a series of experiments which, while carried through on scientific and reliable theoretical ideas, have failed in some few instances to produce the required material, is more a question of local report than of general opinion. The entrance of the chemist into the casting art should certainly be productive of increased confidence in the quality of the output, for, with thoughtful analysis he should be able to correct existing defects, and to guard against a repitition of them.

With the present activity in the iron and steel industries there should be a laboratory in every plant, with reliable men in charge who could make their presence felt and appreciated. There are several plausible reasons why the chemists have not succeeded in getting beyond the laboratory and into the foundry (and especially is this true of the malleable iron branch of founding), one of which is the unwillingness of managers to trust their business in inexperienced hands; and another is that where the chemist has had the authority he has sometimes wandered after strange gods, and, disregarding past experience, has placed metal on the market which, for the time being, gave great uneasiness. Radical changes in casting practice and mixture are generally disastrous, and in making changes we must learn to go slow. A chemist, to be successful, must possess more than a theroetical knowledge; he must be practical, and should realize that the most carefully calculated mixtures sometimes make the poorest metal, owing to the unreliability of proceeding on average samples of pig iron used. His work in the laboratory may be always good, but, lacking in many cases the foundry training he follows the wrong clue when his originals turn out poorly. Pig iron must be considered broadly; anyone who has had blast furance experience will recognize the truth of this. You must be liberal in your views regarding quantities of metalloids and allow ample room for expansion and contraction of same regarding percentages present when calculating. Establish the figure in what is considered the most important metalloid in the local practice, and ease off on the others. The idea that every metalloid has a dominating influence is false. There is always one prominent impurity, the rest being only relative. A knowledge of the other metalloids is necessary, but they should not be given ranking.

The great divergence of ideas prevailing in the iron business orignates from many local conditions and usages rather than from distinct variance of principles—what is food for one is another's poison.

In the exchange of ideas at conventions the earnest hearer cannot fail to observe the shrinking from propositions foreign to local opinion.

As the laboratory is considered to be the mainstay of a modern plant, it is a source of wonder to many that numerous prominent founders are without them, and, when pressed for an opinion as to the benefits that could be derived through the laboratory they have made replies not to be quoted on the subject. Can it be that there are perhaps painful memories back of these noncommitals? for certainly no one, in the face of modern practice and accepted theory, would be willing to state that he believed there was nothing in chemistry. It is very evident that the cause of this reticence lies either in the fault of the individual, or in misplaced confidence. The chemist, to be of advantage to a concern, must be in the foundry, and must be intimately associated with the metal through its various stages in the process of production. If he is cooped up in the laboratory checking up blast furnace reports, it cannot be said that he is giving out information enough to catch defective material. This is the rock upon which parties holding divergent views split. In the open hearth steel foundries the chemist almost

invariably has full sway. Concerning the metal question there is no deviating from his analyses and mixtures; the superintendent has, as a rule, nothing to do with this matter. The foreman molder trusts his molds to be poured successfully, and, if for any reason the metal is not correct and resulting castings are defective, they are replaced as quickly as possible and the experience is called a contingency. There seems to exist in this branch an understood feeling that everyone is working toward the one end, viz., the welfare of his company, and when the metal is poor there is a concerted movement to find the shortest way out of the difficulty, and when that way is found it is recognized by all, and employed accordingly.

Would it not be possible to introduce into the green sand foundries more of this helping and encouraging influence? Taking the chemist's view of the situation, the treatment accorded him in the open hearth concerns does not follow him to the malleable and gray iron factories. Has there not been too much working at cross purposes; too much shifting of responsibility from one to another, with the result that the firms have reaped no benefits whatever?

I believe in the axiom "Live and let live." From observation we find that in the majority of factories the superintendent or foreman is in immediate charge of the molders, and also in charge of the furnace mixtures, and it is argued that a man so placed understands better than anyone else the kind of metal best suited to his patterns. Whenever a chemist has been introduced into such a shop there has been withheld from him much that would have influenced his first efforts. This is a case in which human nature is so predominant a factor that no firm has yet been able to control it. Much of the chemist's work has therefore been for nought, and it has accumulated a prejudice against him. If, however, the chemist and the foreman could work together in harmony, without the petty jealousies so injurious to business, there can be no doubt as to the possibilities of such a combination. The one great mistake has been in expecting too much of an inexperienced man. There must always be a "first time when unfortunately mistakes are apt to occur, and because of these, doubts have arisen in the minds of some who otherwise should have been foremost to recognize the value of the laboratory.

Should the chemist have charge of mixtures? I firmly believe so, provided he is a capable man. He should be thoroughly instructed in the local practice, and should then apply his matallurgical knowledge. Firms so using their chemists certainly realize great benefits. There are many seemingly unimportant phases of cast iron, ignored by the founder, but whose influence upon the product calls for closer attention. Many of these phenomena are never taken into account by those having charge of the mixture, for the reason that during the progress of the heat they are too busily engaged elsewhere, the average foreman's time being fully occupied attending to his other duties at this period.

Is the moment of tapping the furnace the most important in the production? If not, and the melting process demands but passing notice, in the estimation of some, how is it that so many firms believe that even a slight change in methods would be simply ruinous? Have we not emerged sufficiently from the bondage of past traditions to warrant a spirit of mutual confidence throughout the works? Surely the moment is opportune for the probing of all mysteries by the aid of chemistry, and the correction of errors.

The chemist has not usually been accorded the encouragement due his position, no doubt in some instances, due to his youth and inexperience.

How many times has the same identical mixture been put into the furnace by different individuals with the result that in one case the product was excellent, and in another it "would not run pig iron." I believe that the secret of the situation is a "crawling into the shell" of those best able by their situation to help the chemist in his earnest endeavors to succeed, and this has resulted in lessening his opportunities and also his compensation. A cheap man is rarely a profitable one, and encouragement is the best spur to good work, if given either in words or in cash. The chemist would probably find it to his advantage to take a course of instruction in floor and bench molding, as he would then be better equipped for the prosecution of his profession by familiarity with foundry practice.

In the all-important process of annealing, in malleable iron plants, which has been left

pretty much to itself, there is as good a chance for bright men as in the foundry. The exercise of the chemist's functions throughout the plant by a man of ability would enlist the efforts of all hands in the production of the highest possible quality of goods. There should be no friction between the chemist and the foremen, in which case all might jointly share the benefits of the chemist's art. Such a condition would open up a field for chemists in works where now there are no laboratories, and where their skill in metallurgy could be employed in conjunction with the analyses furnished by the blast furnaces.

Perhaps the greatest effort ever made toward the development of uniformity in chemists' analyses, was the adoption by the American Foundrymen's Association in June, 1898, of a national standardizing bureau whose object is, to supply the profession with drillings containing known quantities of metalloids. It has been one of the most noteworthy offerings ever made in the art, for, following its universal adoption by blast furnaces, analyses may be accepted with greater satisfaction than is enjoyed at present. The chemists have as a rule been overworked, and to expedite their work, have resorted to short cut methods for same, hence hurried determinations and variance in results. It is often said that a difference of .01 or .02 in an analyses has no material effect, but where is the philosophy of maintaining a laboratory if work be not accurate? Regarding the laboratory itself it must be said, that in many works, the chemist is slighted as to location, often being placed, where the vibration is excessive and the light is poor, making combined, good, accurate work an impossibility. The position should be well chosen if the expectation of accurate work is to be realized. Cleanliness should be the first consideration. If a chemist could be taken into the foundry and given sufficient territory and authority, he could possibly guard against the production of metal which, passing inspection in white iron is rejected after annealing, or avoid the contingency of sometimes faithfully annealing gray iron. There is in truth much to be said upon this subject, and the advisability of developing the laboratory to its utmost cannot be too strongly recommended.

Core Making by Women.

BY W. W. HARRIS.

Comparatively few molders know anything about coremaking, as it is generally done by persons who never learn the molder's trade, and they that do become molders are few in number, comparatively. This is very different from the condition in the early days of iron founding, when all the cores were made by the molders, and nearly all molders were also coremakers. But the modern practice of employing cheaper help for this work is a marked advance in the matter of economy. This has been carried to the extreme by some founders, under the apparent impression that anybody can make cores, resulting in a great deal of bad work and lost castings. The use of cores has developed greatly within the past few years, many holes being produced by the core that some time back would have been drilled; besides, cores are used now more largely than ever for the purpose of taking unnecessary stock from castings where it could not be gotten rid of by any other means, with economy.

The drying of cores is an art that ought to be cultivated much more carefully than is the practice in many foundries, and the oven, furnace and other facilities should receive the closest attention of the manager.

The introduction of women into the core room marks an interesting epoch in iron founding. Women are specially adept in the making of small cores, and to this branch of the business they are always confined. Several years ago the writer trained a large number of women in the making of cores. The girls made living wages while serving their apprenticeship, and after six months' time were able to earn from seven to nine dollars per week. All our stock cores were made whole, and the girls were able to make for 15 cents per hundred whole cores that, when as formerly made in halves cost from 50 cents to $1.00, the product being far superior also.

A comparison between girls and boys as core-makers is very decidedly in favor of the former. Boys will, generally, dawdle away much of their time, apparently content to make small wages, and taking little interest in their work, whereas with the girls it is exactly the opposite. Much depends upon the management as to results

where girls are employed, and though this is true of any class of labor, it is more emphatically so of female labor in the foundry.

I find that men core-makers are usually glad to be relieved of the making of the small cores, and to give all their time to the larger ones. The female factor in the situation has another great advantage, appreciable by the wide-awake employer, viz: the women set the pace for the men; and it is a much more rapid pace than the latter would otherwise make.

In the case referred to above, the room was specially fitted up for the women, and they remained in it, kept themselves neat at all times, and they always evinced a degree of intelligence equal to that in any class of help.

Another effect of the employment of girls was to stimulate us to the devising of means and methods for simplifying processes, with the result that in the end, very great economies were effected. The proper way to introduce this system is to employ an expert coremaker, one who has had experience in foundries where the best practice is in vogue, and let him instruct the girls, meantime bringing up the facilities to the highest possible degree of perfection.

Chilled Rolls and Why They Break.

[CONTINUED FROM MARCH NUMBER.]

As soon as opportunity served, the author tried it again, and if possible to solve the mystery had analyses taken of the different portions, which were:

Metal before adding ferro-manganese—

Silicon	0.900	Chill 1¼ inch
Sulphur	0.120	
Phosphorus	0.520	
Manganese	0.420	
Graphite	0.540	
Combined carbon	3.360	

After adding enough of ferro-manganese to make the manganese equal to 1.5 per cent., analysis gave—

Silicon	0.950	Chill 1⅞ inch
Sulphur	0.080	
Phosphorus	0.470	
Manganese	0.560	
Graphite	0.900	
Combined carbon	2.930	

The analyses are perhaps not quite in accordance with each other, but are sufficient to show that manganese removes sulphur, and makes iron (that is, cast iron) greyer. If the operation was always carried on at the same speed and to the same extent, it would be invaluable for removing sulphur in the foundry, but it is not so.

In considering why chilled rolls break, it will probably occur to someone to ask, What is the best chemical composition of a hot chilled roll? Generally, roll users ask for a certain depth of chill. Some will say one-half inch to five-eights of an inch, others three-quarters of an inch to seven-eighths of an inch for exactly the same kind of work; some like what is commonly called a painted or clearly defined chill; others, again, prefer the chill to mingle well with the back. In some cases the purchasers do not mind a little mottle; such rolls sent to another works would be at once rejected. Although depth of chill is, up to a certain point, a guide, it is far from being a safe one in all cases. Two rolls of exactly the same composition may have different depth of chill; and, again, two rolls having the same depth of chill may differ very much in analysis. Although a user will not directly admit this if a roll breaks showing a perfect chill, the roll caster is told that the metal is too close, too high, too light in color, and, as a sheet-anchor, the good old standard complaint, "That the iron has been burnt in the furnace," is let go at the unfortunate maker of the roll. It is difficult to get at a proper definition of the latter. If it means that oxide of iron is present in the roll, consequently preventing perfect cohesion, the author considers such supposition cannot be substantiated. In puddling some iron may be burnt, or oxidized, and the burnt iron is incorporated with the ball; but in a furnace simply melting, the oxide of iron, being of a lower specific gravity, rises. Again, it is well known that as long as silicon is present oxygen prefers it; manganese may be also said to protect the iron in the same way.

The question of breakage of rolls is a most delicate one, but it will not be cured by fighting shy of it, nor by trying to set the roll maker and the roll user at cross purposes; it is to the benefit of both that rolls should not break, and if makers and users will meet each other on common ground a great deal may be learnt that will be conducive to their mutual benefit. Bad rolls are made, and the best possible rolls that can be made are broken, neither purposely,

but more through the laws governing their manufacture and use not being thoroughly grasped by the actual workmen engaged in either operation.

It will be admitted that cold rolls do not break so suddenly or apparently in such mysterious ways as hot rolls do; therefore, heat is the factor which lets loose the forces which have such immense power. When making large-grain rolls it is customary to melt down old chilled rolls. A few minutes after these are charged into a hot furnace they invariably fly in pieces, sometimes in four or five, or even more. Commonly the rupture is transverse, but it is not at all unusual for them to split up in a longitudinal direction; a sharp report is heard and you find two or more pieces instead of one. What is the cause of it? There is no mechanical strain at work, and when we consider that the tensional strain at only 8 tons per square inch to pull asunder, say a 24-inch diameter roll, will be 24 inches diameter=452.3 inches ×8=3618.4 tons, the force that is capable of doing such a tremendous amount of work must be great, and as heat is the only thing in the furnace likely to have any influence on the metal it may be well to consider its expansive action.

Rolls break at most unaccountable times, not always at the actual time the strain responsible for the disaster has been put upon them, but as most roll makers and users will agree, the time the majority of chilled rolls break is at three periods—when they are got up for work on Monday morning, when they are let down at the end of the week, and at night time.

The author can show some reason why rolls prefer the two first-named periods for self-execution, but the latter one he is at a loss over.

When a roll is being got up for work, or in other words thoroughly heated to, say, 500° Fahr., the heat must all pass through the outside; if the outer portion is heated at too quick a rate, what is to be expected? The heated outside portion is traveling faster than the cooler central one, and it is futile to expect that they should hang together.

When rolls are being loosed down or cooled the reverse is the case; the outer portion is cooling and contracting at a greater rate than the central core, and if it is not done very slowly rupture is the only result that can be anticipated. The outer skin is of a most brittle nature—to do its work properly it must be—and this outer portion is in tension, the heated centre being in compression; if the rate of cooling is too rapid, compression will soon get the upper hand—it is only reasonable to think so—and the outer skin is cracked. Our friends in the mills will say "But they are loosed down slowly." Do they thoroughly grasp the amount of heat contained in a roll? Get a coal fire, not too hot to be dangerous, and see how long it will take to thoroughly heat up a roll, say 4 feet by 24 inches in diameter, to 500° Fahr.

Hasty loosing down of rolls is one of the most frequent causes of the failure of chilled rolls, and the roll only wants a little heat on restarting to bring the whole matter to a head—in other words, to complete the fracture.

Boilers are frequently damped down from Saturday to Monday; regenerative furnaces, etc., are kept going to save a little fuel; why cannot rolls be kept warm, and thus frequently save a valuable tool?

"Rolls frequently have their necks twisted off." That is the usual mode of expression, but is it correct? Unless there is an evident defect we rarely, if ever, hear of a wobbler being twisted clean off. Then why should the point of fracture usually commence in the angle of the neck, where the neck is larger and should be stronger? If the heat of the body is being kept up, and even increased, is the neck allowed to become hotter or expand in the same ratio? We know that it is not so. Yet cast-iron is blamed because it cannot go two ways at the same time. Sometimes, probably, the neck does get too hot, but failures in the necks of rolls arise principally from sudden cooling or from being kept too cool, and thus enormous strains are set up between the body and the neck. It is an awkward job to keep the necks at a right temperature, but would it not be better to do so than risk the destruction of the roll? To prevent brasses cutting, let larger bearing surfaces, and, if necessary, larger housings be used. If we could only see before us the money value of rolls sacrificed because larger or longer necks could not be got in the housings of old trains, we should go home to-night sadder and wiser men.

Some rolls break because they are used too soon after their being cast; they are pulled out of the molds too soon, and put to work too soon. That is because roll users will not order until they are compelled to, and some-

times even have their mills standing before the roll can come in from the foundry.

It cannot be too clearly understood that it is impossible to make such a casting as a chilled roll without internal strain, considering the different characteristics of its constituents.

It is well known in cold-blast furnace yards that high iron improves by keeping, and that iron which perhaps was stacked for, say, No. 6, some 10, 15, or even 20 years before, ultimately finds its way into the market as a good No. 5 or even a No. 4.

The old system of keeping rolls in stock was a better one than the practice now in vogue, though, whether it was done for a purpose, or the financial difficulty was then not so pressing, is doubtful.

Rolls break because mills are undersized, or were never designed in the first place to do the work now placed upon them housings are worn, chocks are loose and have to be lined or packed up. These are difficulties which are incident to all the old plants; but it is to be regretted that proprietors do not, when putting down new trains, always realize the importance of having all housings, chocks, bed-plates, etc., truly planed and fitted. If one were to suggest that the engine was quite good enough if fitted together in the slipshod manner the mill usually is they would be horrified. Efficiency is sacrificed every day because the first cost looks alarming, but the extra first cost is a mere bagatelle to the subsequent failures and loss caused by cheap, rough fitting. Some critics will, no doubt, say that the fault of this lies with the builder of the mill; but it must be borne in mind that the builder is tied down to a certain sum. If purchasers will only pay the price, there are plenty of good engineers and ironfounders willing and ready to turn their work out a credit to themselves and their patrons, but their efforts must be recognized.

Continental firms are certainly in advance of ourselves in this respect. Why should it be so?

Great stress (and rightly so) is laid upon the fact that at the present day rolls break more often than in former years, because they are harder worked. This is properly a question of excessive heat. If a roll could be kept (for rolls) at a comparatively low temperature and yet pass work through quickly, this trouble would doubtless disappear. We have had designs of rolls that we are told can be kept cool; but will any roller say they are practicable? Length of life in a roll shold be properly measured by the class and amount of work done, not by time.

Bad turning is frequently debited with the cause of the failure of the roll. This, at any rate, is a thing which can be proved before the roll is put to work, and the blame, if any, laid upon the right shoulders. A roll turned week after week in the housings is not altogether the same thing. Necks wear, and should they wear oval, as most journals do, the body will be oval likewise, because it is simply an enlarged copy of the neck. When fracture is caused by this, it is not the roll's fault, or its maker's either.

I quite believe that roll users are as anxious as makers to help to improve matters; therefore, let them consistently and regularly analyze the whole of their rolls for a good period, taking care that the drillings are always from the same position on the roll. The bottom neck or wobbler I would suggest. If taken from the interior of the roll or top end the drillings may contain a portion of the feed iron, and the analyses would lead to erroneous conclusions. Let them compare those that have done good work with those that have not. If there is anything wrong with the composition of the iron they will at least detect a difference in the analyses. Let them be more open with the roll maker. When they get an extra good roll give him its number or other distinctive feature, and say what it has done. I have no need to say anything about those that fail, as the maker is always informed about them, so in common fairness he should have the whole of the tale.

The President, Messrs. H. Silvester, J. Tucker, J. H. Hall, M. Millard, H. Pilkington, Toy, and others took part in the subsequent discussion, and the meeting terminated with a vote of thanks to Mr. Nicholson for his paper.

I inclose one dollar to pay my subscription to THE FOUNDRY. I would not be without it, and am glad to see it improves with every issue. JAS. A. BECKETT.

I consider THE FOUNDRY invaluable, and find practical suggestions, useful hints and good points in every issue, for the patternmaker as well as for the founder.

W. F. DORNHEIM.

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Trade Outlook.

So far as current demand for foundry product is concerned, the business prospect is bright as could be wished. To people unfamiliar with the practical side of business management it might seem that the manufacturers' sky is without a cloud. But in very fact, such a time as this is fraught with danger to many, and the only reason that more failures are not recorded is that people generally believe that the "good times" will eventually make strong firms that are now weak, for, no doubt, many concerns that were strong financially six months ago are hard pressed to maintain their standing just now, and will be for some time to come. It is not possible for a man always to base his contracts upon his own forecast of the future, for, though he may feel certain that prices of raw material and of labor will advance from 10 to 25 per cent within six months of the date of his contract, his competitors may think otherwise, and the general opinion compels him to name a price that may be nearly or quite absorbed by cost. Profits were none too high, generally, to say the least, before the boom came on; and when we consider the large advance in cost of raw material and labor, with price of product fixed for a comparatively long period in the future, it may readily be seen that the great business revival is not an unmixed blessing to all. No doubt a great deal of stock was provided for at prices current when contracts were made, but not all, nor nearly all.

It is much easier to raise the price of raw materials than of manufactures, perhaps chiefly because the sources of supply of the former are comparatively few in number, making possible greater harmony of action by the controllers. Again, the market for raw material is worldwide, while it is not so with regard to some particular machine. For instance, No. 2 foundry iron may be sold anywhere in the civilized world, at any time, while Messrs. Goodman, Badman & Co.'s cornsheller must expand its market, if at all, by slow degrees, and the price cannot be increased unless the price of competing cornshellers is also advanced; and the competitor may have bought a large stock of raw materials before the advance in price, and he will use this advantage to enable him to win trade at the expense of Goodman, Badman & Co., if he can. But, when the competitor runs out of low-priced stock, he will join with his "friends, the enemy," in advancing prices of product.

We have not yet arrived at this stage in the unfolding of prosperity, but we are getting along towards it very fast, and when we do get there, all will make a new start, from a practically common base, and so, everybody will share in the good that the improved conditions afford.

One of the most satisfactory features of the present situation is the general harmony that prevails between the employers and their workmen. There are no important strikes, and there have been none. The committee of the National Stove Manufacturers' Defense Association met the committee of the Iron Molders' Union of North America, in Chicago, on the 15th of March, and a 10 per cent advance in wages was agreed to; and that will stand for one year without a doubt; and there will be no possibility of a strike for higher wages, or against a reduction, in the stove manufacturing industry for a twelve-month to come. The National Founders' Association is making every effort to do for the rest of the foundry trade what the Defense Association is doing for the stove trade, and if all foundry operators would join this association, as they ought to do, there need never be another strike in the whole foundry industry.

These associations adjust differences on

lines of equity and fairness, and the man, workman or employer, who is not willing to do this, is a dangerous factor in the industrial economy, and he is going to be a far less popular individual, to put it mildly, than he has been in the past.

There is an important element in the world's industrial situation that goes far to account for the universal prosperity, both in Europe and America, which we have not touched upon thus far, and we have not observed any mention of it by our contemporaries; and that is what may be termed the latent power of society to expand its activities in production and consumption, without reference to apparent conditions of supply and demand. For years past a vast aggregate of force in capital and labor has been unemployed, and yet, a latent demand (which consists of desire to possess) always existed for the possible product, and now that circumstances have set these forces at work, their product does not overstock the markets, simply because their product (or its equivalent) belongs to themselves, and they are consuming it. Another powerful factor in the problem is the fact that the increased price of the products of industry places a tax upon the recipients of the fixed prices, the full amount of which is virtual contribution to the producers. When we consider the vast aggregate of money paid annually in fixed salaries, and in interest on debt; national, state, county, town, municipal, corporation and individual, besides other prices that have not risen along with the prices of general products, some faint idea of the great advantage higher prices are to employer and wage-workman may be formed; because the income of the latter is increased to cover the rise in general prices, while the burden of the fixed prices, so far as they are concerned, is not augmented in the least.

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To snarl at people for making money fast is not calculated to make one popular—with the fellow that's making the money; but that is just what we propose to do, and we are willing to take the consequences. The price of pig iron is at this moment entirely too high. The margin between cost of production and selling price is simply enormous; and every cent of it beyond what constitutes a fair profit is being wrested from the user simply because the latter is in a tight place and cannot help himself, and the pig iron maker knows it. If this exorbitant tax were evenly placed upon the whole public the situation would not be so bad; but it is not so placed. There are hundreds of manufacturers whose contracts for delivery at prices fixed before the recent advances in price of iron run far into the future; and, if the price of iron had not advanced beyond a figure that would have afforded a good round profit to the producer, all would have been well with them; but, with raw material at its present price, there is no possibility of profit to many, and if things go on as of late, it is difficult to see how the foundrymen are going to escape bankruptcy. Two months ago everybody felt hopeful that good business sense was going to prevail during the rise of American industry from the slough of depression to the broad plains of prosperity. But it is now evident that the selfish element in human nature has gotten complete control and the disposition to exact the last penny that can be rung from the helpless foundryman is to have free rein.

It may be good business policy to "charge all that the traffic will bear," if the proposition relate to permanency. But to charge all that can be gotten for a short period, viz., till we shall have ruined our customers, is simply madness.

If a lot of workmen were to strike for a 25 per cent advance in wages at a time when they knew that their employer had taken large contracts that would place him wholly at their mercy, and when it was reasonably certain that the advance in wages would render the work entirely profitless to the employer, society would cry shame upon them, and justly so. There is absolutely no reason why the same cry should not now be directed against the manufacturers of pig iron. Iron is the dominant factor of American industry, and they who control its supply can either make or break the country by their conduct. Pig iron could be sold to-day at a price that would yield a splendid profit to the producer and at the same time permit the foundrymen to realize a fair profit on contracts made at the beginning of the year, and this, after all advances in wages have been covered, thus maintaining the integrity and strength both of the producer of the iron and his customer. As it now is, however, the pig

iron maker is taking, in many cases, all that the founder gets for his product beyond the other items of cost, and a slice from his past accumulations into the bargain.

The business world to-day needs to organize just one more combination, for the purpose, namely, of applying intelligent, humane business principles in the conduct of industrial affairs. The aggressive disposition of the wage classes is not the most important element of menace to the manufacturer by a long way. He stands in far greater danger from the wolfish greed of individuals of his own class, who give but little more thought than the wolf to the results of their ravening.

The day is past when men could point to the so-called principles of political economy as laid down by Mill and Ricardo in justification of unfair methods. Mill is dead, and his "science" is much more dead than he; contradicted and confuted a thousand times as it has been by the facts of the last thirty years of economic history, both in America and in Europe.

Under a system of fair dealing, guided by intelligence, every factory in the whole country could go on and thrive, and others would constantly rise and prosper; but, under the reckless predatory system now in vogue, in less than two years hence every State in the Union will be strewn with the wrecks of ruined business concerns; and then, as we look around upon the devastation wrought, there will be no lack of wiseacres who will, with owlish gravity (and with pig-headed imbecility) announce to the bewildered and exhausted world, that "We have been passing through a sifting process wherein the weak and therefore dangerous concerns have been shaken out, and the business world is now upon a solid foundation whereon it may confidently"—etc., etc. We need not recite further of the sickening jargon, for the reader is all too familiar with it, from its frequent repetition within the last thirty years.

What About the Sabbath.

To discuss the status of the Sabbath day from a religious standpoint in the columns of a trade journal would, at the present day, be inappropriate, no doubt. But, in the light of common sense, dealing with past experience, can we afford to do away with the seventh day rest? Can the molder, as molders now work, continue the year round without rest? Can the employer stand the terrible strain of the business round with an added day's work in every seven? The general answer must certainly be no; and suppose it would be possible for all society to pursue the unceasing grind without cessation, would any benefit be derived? It would be but a short while till seven days' work would bring to workman and employer alike no more than was formerly derived from the six days' labor. Just now, when the general practice is to work but six days, the few who continue through the seventh also, may gain a decided advantage over their competitors; but, when the direful day shall come, if such a fate be in store for us, when all factories shall run continuously, where then will be the advantage? The adding of another day's work in the week will have no possible effect in diminishing competition, whose effect is to cheapen product with every gain in productive capacity. If tomorrow we shall find means whereby the labor of one man will produce twice as much as today, the price will soon be correspondingly reduced, as all experience teaches. What then will society have in exchange for the Sabbath?

It is highly to the temporal interest of every class that the Sabbath should be forever preserved as a day of rest for all. And if it is to be preserved, something must be speedily done or it will be forever lost; or, at least, it will be lost to the present civilization, and until such time as a higher civilization shall rise upon the ruins of our own, and shall establish justice and reason in the conduct of human affairs. No doubt many of those who run their factories on Sunday would be glad to discontinue the practice if their competitors were compelled to do likewise. It is simply a matter of overreaching in competition, many running not only on Sunday, but as much as possible into the night also, in the race to outstrip their competitors. The great need of industrial society is closer organization. Thus far, or till quite recently at least, the capitalist, so-called, has been a free lance in the world of business, thrusting his spear of reckless competition through his neighbor's heart, and being thrust through himself in turn when fortune happened to favor his adversary for a moment.

In the foundry business the Stove Manu-

facturers' Defense Association and the National Founders' Association have taken a long stride toward more civilized methods. They have not done away with competition, nor do they seek to do so; but they have put a curb upon purely destructive practices which never benefited anybody but worked general harm instead. It would be within the power of such societies to preserve the integrity of the Sabbath; and since the general verdict of all sorts of people is in favor of the Sunday rest, and strongly denounces its omission as universally harmful, and tending to mental and physical degeneracy, it would seem that steps looking to concerted action by all industrial associations are demanded, and cannot be taken too soon, in view of the obvious fact that if things go on as for some years past, we soon shall have no Sabbath.

The foundry operator who also owns ore and coal mines and smelting furnaces may view with unctuous complacency the meteoric career of the price of pig iron. His iron does not cost him but little more than when it sold for what it was worth, instead of as now, for any price he may see fit to charge; and so, while his neighbors, whose capital is all invested in the foundry business, are being ground between the upper and nether millstones of high-priced iron and low-priced contracts, he enjoys unwonted prosperity; for, while his foundry enterprise is highly profitable, at the same time his pig iron prices levy an exorbitant tax upon all his competitors in the foundry business.

A New Way for Making Pipe Cores.

Our correspondents occasionally permit the newspapers to get a scoop on us with regard to new features of foundry practice.

THE FOUNDRY rather prides itself on being at the very fore-front in matters pertaining to the founding of metals, and it hates to be forestalled at any time by any other trade journal, but when a newspaper scoops us, we feel particularly uncomfortable.

The particular scoop here referred to is the following, in the Detroit Evening News: "Money in Marsh Grass—

"Algonac—This is haying weather for the farmers adjoining Lake St. Clair. There are thousands of acres of marsh lands, of which only a small per cent is utilized. The cutting of marsh hay is bringing a good return to the farmers. This marsh grass is used exclusively by the manufacturers of gas and small water pipes. This grass or hay is without a joint, and brings from $6.50 to $8 per ton. The manufacturers twist long cubes of it into what they call cores. These are then covered with red lead and used in casting the pipe. The heat of the molten metal burns up the core. Thousands of tons of this marsh hay are now being prepared for market, and the former despised lowlands pay a better revenue to the owner than his cultivated fields."

We confess, with feelings of humiliation not easily described, that we never before knew that the manufacturers of cast pipe—gas, water or any other kind—"twisted long cubes of grass into what they call cores, and, covering them with red lead, used them in casting pipe."

We are, however, comforted somewhat by the reflection that possibly the News got its information from the wrong end of the hay rope; that is, from the farmer who made the hay rather than from the foundryman who used it in the making of pipe cores. But, aside from the technical question of the manner of using the hay in the foundry, we wish to ask, what kind of thing is a "long cube?" We always supposed that a cube was a regular solid body with six equal square sides!

No Profit in Pipe Foundry?

In the year 1886 the Glamorgan Pipe & Foundry Company, of Lynchburg, Va., employed 15 men; during the last ten years the company has paid regularly a ten per cent dividend to the stockholders. The undivided profits are now $100,000, and the business has just been sold to a new company for $175 per share, or $262,500 for the whole. And yet, some people say there has been no profit in pipe founding for many years past! If this is true, then the general public, in view of the above, may be excused for entertaining a hope that there may be no profit in the business for a long time to come!

* * *

It is reported that the 4,200 men employed by the Michigan-Peninsular branch of the American Car & Foundry Company, are now getting 95 cents a day, an advance of 10 cents a day on the former wages. The

newspaper from which the above is taken goes on to say that "the company was averse to allowing its benevolence to be known." If this sort of "benevolence" should be repeated a half dozen times the men might become self-supporting!

Mr. Nathan P. Reed, of the Somerville Iron foundry, East Somerville, Mass., writes us that their business is expanding so greatly that the company has decided to erect a new large foundry, fully equipped with modern appliances.

The American Emery Wheel Works, of Providence, R. I., recently booked an order for $8,000 worth of emery wheels and grinding machinery to go to Germany. They state also that the demand for their wheels in England is constantly growing.

The Buffalo Forge Company has changed its New York offices from 406 Havemeyer building to more spacious quarters at 114 and 115 Taylor building, 39 and 41 Cortlandt street, where they will be pleased to meet their friends.

Car Combine Profits.

It is figured that with a continuance of business at the present rate, the total profits for the year will exceed $65,000,000. Nevertheless, we wouldn't give three cents on the dollar for the common stock of any of these big trusts, for a day of reckoning is coming when these top-heavy concerns will fall to pieces; for, when so large a proportion of the products of industry (or their equivalent in money) goes into the hands of a few, the balance of supply and demand cannot be maintained for any great length of time.

The Inventive Faculty.

What Mental Peculiarity Enables One Man to Invent a New Thing Which Another Could not do.

BY W. J. KEEP.

The inventive faculty is the ability to see an object which exists only in the imagination, as plainly as though the real object were before the eye. If it is a machine its operation can be followed nearly as well as by operating the real machine. Defects can be detected and changes to overcome such defects can be seen by the imagination. A blind man can invent if he has this faculty. Some minds are able to make new combinations and inspect their operation by an effort of the mind more readily than others. When it is difficult to see clearly the operation of a machine which is pictured by the imagination, the making of a drawing of the idea will relieve the mind of the effort to see the whole machine, and the whole force of the mind can be concentrated upon the details which need change or further elaboration, and by completing this on paper he has so materialized his conception that others may see what he saw before he made the drawing. To understand a mechanical drawing so as to be able to see how the completed machine will look, requires a mind with a little of the same power of imagination as that which enabled the original designer to see it without any drawing. Those who have become expert in the use of tools generally from practice are able to read, or see through a drawing more or less perfectly. A workman who cannot work from a drawing could not make any portion of a machine, because the only way the originator could tell him what to do would be to describe his idea by words, which would require his hearer to form in his own mind a picture of the thing discerned, and if he were capable of seeing this mental picture he could much more readily see the thing if he had a drawing before him. But however quick a mind is to picture an idea in the imagination, it may require considerable study of a mechanical drawing before the object or the operation of the machine is understood; therefore after a drawing of a macaine has been made by the one who has conceived it in his imagination, it is generally necessary for him to explain the operation from the drawing to enable others to understand it. Very often this explanation will develop defects which did not appear to be such before he expressed the thought in words.

For this reason a man often completes his ideas by describing them to some one who is not capable of understanding him at all. By putting his thuoghts in words he develops details more fully than by unexpressed mental consideration.

Successful invention should be completed in the mind and on paper because it is in expression. The next step is to construct the machine, which is expression.

Some persons think they have developed an idea but cannot put it on paper. Such

often go to an expert designer or model maker and describe what they wish to accomplish, and pay another mind to develop a device which will do the work.

A person who can look at a free hand drawing and can make a copy of it is obliged to carry the picture in his mind long enough to copy some portion of it. He then takes another look at the original and carries it over again and adds to his copy.

To draw from nature is to see the outline and shadows of a natural object and carry a mental picture over to the paper and cause the pencil to trace the lines which the mind sees. When the mind has forgotten the appearance it goes and gets a fresh impression.

This ability of the mind can be developed by practice and this is the object of taking drawing lessons.

To originate the object in the mind and then transfer the mental object to paper so that a mechanic can construct the object is invention. The following is an example of invention. A machine that had been developed mentally and had been put on paper and had been constructed developed defects. In one part changes must be made to overcome friction. Another part which transferred a motion and multiplied it several times did not do what was intended and must be made to do the work in a more direct manner. The mental operation began and a device was conceived which would overcome the friction, and while holding that in the imagination a separate device of a somewhat complicated character was developed to overcome the difficulty, but neither seemed satisfactory.

At this time the work for the day ceased. The evening was spent in looking at some exquisite dissolving views of beautiful mountain scenery. The thought of the machine had been entirely dropped but on the way home the difficult parts of the machine all came out clearly, and then the device for overcoming friction, and that for transferring and multiplying motion dissolved into each other, and a single device of very simple construction accomplished both objects. Other parts of the machine had changed shape at the same time to conform to the new order. It took only a short time to put it on paper and soon the trouble was over.

The training of the mind for half an hour in seeing one natural object merge into another enabled it to operate in the same manner with the mental pictures which it held up to view.

The inventive faculty can often be developed in a mind when its existence has never been suspected.

Mr. H. F. Frohman informs us that Mr. E. F. Woodison has been engaged to represent the S. Obermayer Company on the road.

Philadelphia Foundrymen's Association.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club in Philadelphia on Wednesday, March 1, the president, P. D. Wanner, occupying the chair.

The Executive Committee's report referred to the absence of profits to foundrymen on business undertaken during 1898, and to the discussion on the subject which formed part of the proceedings of the last meeting of the association. Since that meeting, the report stated, the committee had found one or two foundrymen who had profited by the lessons arising out of that discussion, and had absolutely refused to renew some of their orders at former prices, notwithstanding that the customers insisted that the prices formerly paid were higher than had been offered by other founders. This evidence of backbone resulted in a higher price being obtained, and the patterns remaining at the foundries. The customer in the market for castings understood the situation, and used the name of one foundryman as a club with which to knock the other foundryman down; and as there was no understanding existing between foundrymen in general such state of things might continue indefinitely. With pig iron and raw material advancing, the foundryman was entitled to at least the difference in the cost of his castings, but from timidity he did not ask an advance, fearing his competitors might get the patterns he had held contracts on. The report further emphasized the importance of foundrymen demanding higher prices, and the belief of the committee that they could be easily obtained.

The chairman, in commenting upon the report, drew attention to the danger threatening foundrymen who had taken low priced contracts and had failed to cover them by purchases of pig iron. The strong advances in the pig iron market to-day, he said, were equivalent to those made in the same market during the exciting period of 20 years ago. History generally repeats itself, he said, and who could say that something of a

repetition of those times might not be experienced? Of course, things had changed very much since then, but he would not be surprised to see some grades of pig iron go up to $25 per ton. The fact that prices had advanced was not the only thing in the situation. A most serious question was that it was difficult to book for prompt delivery at any price. If any one doubted that let them go into the market and try to buy. If much work was taken now by foundrymen for delivery within the next two or three months they might find themselves in a fix, unless their supply of pig iron was assured. The funniest thing about the situation was that in spite of the scarcity of iron, and a material advance in the price of it within the past year, the prices of castings had not advanced to any extent. This would apply to all branches of the foundry trade. Foundrymen were certainly entitled to better prices from a market standpoint, and the subject was worthy of profound reflection.

The secretary reported a desire on the part of certain members of the association to get the association to take up the question of credits for the protection of its members. It had become quite a common thing, he said, for unscrupulous persons to run up a heavy bill for castings with one foundry, and when defaulting in payment open an account with another and so on. He instanced a case where four foundries had suffered from one such customer. Various ways and means of notifying foundrymen of such dealings were discussed, but the matter was finally referred to the Executive Committee.

Secretary Evans showed several lantern slides descriptive of the Farquhar pulley molding machine.

F. A. Riehle, Riehle Bros. Testing Machine Company, Philadelphia, then read a paper on "Testing Machines," illustrating the same by a number of lantern slides.

TESTING MACHINES.

It is a strange coincidence that our first paper upon the subject of "Testing Machines" should be read before the Foundrymen's Association of Philadelphia, and that the first testing machine our firm was called upon to design and construct was for a Philadelphia iron foundry. The party referred to was at that time one of the most prominent in this locality, and the member of the firm who called to consult about it and finally ordered the first tester is still living. I mention this fact because most of the firms with which we had dealings, nearly 33 years ago, have passed away—that is to say, the partners of the firms, and especially the senior members. The name of the gentleman above mentioned is Mr. Samuel Fulton, of the firm of S. Fulton & Co., who had an extensive pipe works at Conshohocken, near Philadelphia.

The necessity for a machine was urgent, and it was of the greatest importance that we should have it constructed as rapidly as possible in order to make an immediate investigation as to the strength of the iron used in the pipe they had constructed for a contract. We never learned as to the quality of the iron tested but understood that it was satisfactorily demonstrated that the quality of the iron was up to the specifications, and are under the impression that the information thus gained settled a pending lawsuit and that it was in favor of our Conshohocken friends.

The matter of physical testing of materials, while it may be considered a hackneyed subject to many, is, we believe, just in its infancy, and we are convinced that the time will come, and in fact is near at hand, when every up-to-date manufacturing plant will be considered to be ill-equipped without a testing department. In fact, some parties have stated that they consider their testing machine the most important tool in their works, and, to quote from their letters, they say: "We could not run our establishment without it." While very important results are being obtained by the testing of materials in the form of test specimens, the most valuable and far-reaching results will be obtained by testing all forms of machinery, or sections of machinery, and structural forms in their full usable size, as far as it is possible, and by an occasional test of such forms to destruction. The desire for a test of this nature is manifested when a test is made of a bridge after it is placed in position, by loading it with a very, very great weight. This has been, and can be, done by placing upon it as many of the heaviest type locomotives as it will hold; this test goes to check up or prove the result obtained by theory and by testing the component parts of the bridge upon a testing machine. Frequently parties prove the strength of a small structural mem-

ber by piling railroad iron or pig iron upon it up to the full strain to which it will ever be subjected in actual practice. This is a very satisfactory and correct way of testing, and in the absence of a large enough testing machine to take in these small structures (we of course do not refer to a large bridge) is the only proper test that can be obtained.

At the present time chain manufacturers are required to make tests of the chain after it is finished and ready for use, and one section of chain in every certain number (say every 10 or 20 sections) is broken. Spring makers also test their springs under the same conditions as they are used in actual practice. Building material, small structural pieces, such as brake beams, car bolsters, etc., can be tested with beneficial results in the sizes used; also timber and similar material. The benefit of testing materials to destruction and in full sizes is being more appreciated daily, and the most important results have been attained, and especially in regard to tests of timber. As far as we know, the testing of timbers has been more exhausted than that of any other substance. The United States government has accorded a great deal of attention to this matter, and furnished extensive and elaborate reports based upon the results of these experiments. Extensive and valuable researches have been made by the United States government of iron, steel, and alloys at the Watertown arsenal by carefully prepared test specimens; but these tests are not as important to iron and steel manufacturers and users as if the material was tested in full sizes. It is an important fact, and should not be overlooked, that tensile tests of small specimens run up higher than tensile tests of the same material in larger sections.

Some time ago a very large contract was made for furnishing steel bridge members in large diameter—we think in five inches diameter, perhaps more. The contract was based upon the result of experiments and tests made on the same quality of material in the form of test specimens one inch or one-half inch area. The result was that the strength of the large members did not come up to the specifications and the material was rejected, and the consequence was it ruined the company. Anyone can constitute himself a testing machine by breaking a piece of thread or cord, thereby making a tensile test; or, he can break or bend a piece of wood or thin piece of steel upon his knee, making a transverse test. A person makes a compression test when he steps upon a floor or frail piece of mechanism. The comparative strength of two, three or more specimens can be very readily perceived, but the test is limited to the strength or weight of the individual. This method of testing, or some crude device, will answer for some people, and has served for everybody—before the introduction of testing machines. Every one wants to procure the strongest material obtainable, provided the price and other requisites, such as appearance, bulk, etc., are suitable. Then arises the question, not as to whether one specimen is stronger than another, but precisely how much stronger. Frequently parties have found upon investigation that they are using too much material for their purposes or necessities; then comes the matter of economizing or reducing the size or quantity of the article sufficinetly to meet their ends.

The pipe manufacturers were among the first people to purchase and use testing machines. Four or five firms procured them in quick succession; among others, R. D. Wood & Co. for their Florence Works, Warren Foundry, and several others. Soon after a law was passed in congress that all iron and steel used in the construction of boilers for the United States government should be tested for tensile strength. It required that coupons should be cut from boiler plate and each coupon tested for its tensile strength. The United States was then divided into ten districts. It may have been divided into more; but an order was given for 10 testing machines for 10 districts; probably the other districts were not important enough to require a testing machine for this purpose. At the present time we think there are 14 or 15 districts in the United States, and are under the impression that each district has a testing machine for this special purpose. At this time (we refer to the time when the government supplied itself with the first testing machines), the testing of iron, metals and alloys received greater attention, and the action of the United States government led to the use and purchase of testing machines by all the prominent boiler plate makers, and subsequently by rolling mills, steel and iron works. Shortly after this period testing machines were introduced into colleges and universities in the departments of mechanical engineering. Simultaneously with this wider use of machines, railroad

companies took up the matter of physical testing of materials, and physical testing laboratories on varying scales were established by the leading railroad companies throughout the United States. The Pennsylvania Railroad was among the first to avail itself of the advantages of this new device and procured a couple of Riehle testing machines over 20 years ago. We believe they are in active use at the present time, and have been continuously since the time of their installment.

To trace the use of machines still further, we might add that the pig iron manufacturers began to appreciate the value of testing their iron before placing it in the hands of the public, and they too invested in testing machines. The manufacturers of charcoal iron invested first, and subsequently the manufacturers of anthracite iron. Since this time the large machine shops and progressive manufacturers of every kind of material have been making physical tests of the articles entering into the production of their finished goods. And then more recently still, all manufacturers who can possibly arrange it are testing the actual finished product in the full size and form in which it is used in practice.

It is impossible to give you an adequate idea either of variety of testing or a list of the various articles to which tests are, and can be, applied. As to the articles, the principal tests are of iron, steel and alloys; then building material, such as wood, bricks, stone, asphalts, cement, etc.; then wire, chain, wire and hemp rope, cloth, canvas, leather and canvas belting, leather, oils (for their lubricating qualities), hose for its resistance to bursting), brake beams, car bolsters, car springs, parts of bicycles, wheels, etc.

Some of the tests on these articles are by tension, transverse and compression strains; torsion or twisting strains; abrasion, indenting, shearing, bursting; and we might include a drop test of brittle substances, such as crockery ware, glassware, etc., which test is introduced by the United States government in its quartermaster's department.

The extensive use of wire for telegraphs, telephones, musical instruments, etc., has led to the construction of testing machines built especially for testing this substance. Wires are made of alloys (many of them), and manufacturers desire to test the quality of different mixtures and temper of the wires by pulling, bending, twisting and breaking; also breaking by the greatest number of bendings, just as one would break off a small piece of wire with the fingers, and they come with all their various and difficult problems to the testing machine manufacturer to devise some special appliance to satisfy their every want. One piano maker wished to procure a wire of a certain mixture, size and temper, such that a given strain applied to it would produce a certain tone, say key of A or B, and so on. This required fine calculations and great skill on the part of the manufacturer and finisher of the steel. We merely mention this incident to show how testing and results go hand in hand.

The first machine constructed at our works was a very crude affair compared with the style of testing machines made since. It consisted of a compound parallel crane beam suspended in a wooden frame about eight feet high, and from a stirrup connected with an old-fashioned Shaw & Justice hydraulic jack. Below the crane beam were suspended tools for gripping the end of the tensile test specimen. Secured to the lower part of the frame were the tools for gripping the other end of the tensile test specimen. On a wooden projection rested a hand power hydraulic pump. From this pump was adjusted a tube carrying the fluid from the pump below to the cylinder of the jack. As the pump was operated the plunger of the jack, the stirrup and the crane beam were raised, and the test specimen being secured in the grip holders was strained and the strain weighed by weights placed on a bale or weight-dish suspended from the end of the crane beam. While plain and true, it was still an accurate and reliable testing machine, but exceedingly awkward.

The next style of testing machine was one of 150,000 lbs. This machine was as crude as the one just described. The crane beam, plunger, jack, and hand pump were the same as used in the first machine; but instead of the test specimen being pulled direct away from the crane beam, the latter was connected with the lever which increased the capacity of the crane beam five times. From this increasing lever the tensile tools were suspended and the specimen secured thereto. Both these machines, or machines precisely similar, and made by us, have been in con-

stant use ever since they were made. We made several of each form. One of the first boiler plate makers to buy one of these large machines was Messrs. Gaylord & Co., Portsmouth, O. Since these first crude machines were constructed many improvements have been made in every direction. The first machines, as you were informed, were made with wooden frames. They were afterwards made with iron frames. The first call for iron frame machines was from the government, which ordered 10 frame machines for the department of supervising inspectors of steam vessels. Then, as the requirements of the public demanded, machines were made in larger capacity and for a greater range of usefulness. Afterwards, parties required that machines should be arranged to work automatically; that is to say, as the strain increased, by means of the straining mechanism, the poise on the beam, instead of being moved by the hand, was advanced by an automatic appliance. The poise moved out until the weight on the beam exceeded the strain on the test specimen, when the beam dropped and the motion of the poise ceased until the strain again increased. By an adjustment, the poise can be made to move quicker or slower, so the beam will act more in harmony with the quality and nature of the test specimen. If the test specimen is brittle, the poise must advance quickly, or else the specimen will break before the poise reaches the breaking strain on the beam. On the other hand, if the test specimen is tough or ductile, the beam must advance much slower than the straining mechanism. The skill and experience of the operator will soon determine the proper speed of the automatic adjustment.

You might be interested in some incidents that occur in connection with a testing laboratory. The experience is certainly a varied one, and you would be surprised to hear a list of the articles and materials that come to hand for testing. It would be impossible to give you a list, but we might mention some. Some one brings a small article, so small that it is impossible to hold it in the grips; others, too large pieces, that it would be impossible to test as they desire. We have made tests of cold pressed bolts, and hot pressed bolts, for their shearing qualities. One party brings an ordinary nail and a patented nail, and wants to prove, by way of experiment, for a patentee or publication, which nail requires the most pressure to make it pass into a piece of wood, and wants another test to see which style of nail takes the strongest hold on the wood, and then to compare the apperance of the fibres of the wood which the nails have displaced. People bring a piece of pig iron for tensile test—even a brick for tensile test. These we inform them have to be properly shaped to make a suitable test. Another party wants to learn the strain, by pressing, that the hub of a wheel will stand, by the pressure of a spoke into the hub; namely, an ordinary hub as compared with a patented hub and spoke. The first bicycle wheel, now in common use, was tested at our laboratory, and the results surprised both the maker and the patentee. Frequently very suspicious pieces of metal come to us to be tested and the parties require that an affidavit of the test be made by the engineer. This savors of the unpleasant suspicion that we may be called upon to give some testimony in a court. We even had a piece of rope sent us to be tested, and while the matter was never plainly mentioned, from what we gathered it gave color to the impression that it was tested for the purpose of seeing if it was strong enough to hang a man, with success—not to the man, but to the municipal authorities.

Some time ago, one of the senior partners of an iron concern still in existence came to see us and, evidently in a disturbed state of mind, inquired whether we kept a record of the tests we made from time to time. The reply being in the affirmative, he requested a duplicate report of a test made on a certain date be given him, as he had lost the original. During the time the search was being made for the report asked for, it was very evident that this same gentleman was intensely exercised in his mind. In a short time he was informed that the report of the test was found and he was handed a duplicate copy. Upon receiving the copy he said: "This report is worth $6,000 to me, as it settles a dispute in our favor in which the matter of the strength of the material tested was brought up, and I see that the report is as I recollected and informed the other parties, but nothing could be done or settled until this report was reproduced."

One of the smallest machines we ever made was on an order of a gentleman who came to see us, who asked for a tensile test-

ing machine so small that it would break specimens of iron or steel about the size of the lead in an ordinary wooden lead pencil. This gentleman was Dr. P. H. Dudley. As you no doubt all know, this gentleman is a railroad company's doctor, and is called upon to solve every mechanical problem that can be conceived of arising in the operating of a railroad company outside of the book-keeping and accounting departments. You have all heard of his car in which he and his wife lived and made their permanent home, if a home that is never permanent can be so called. Dr. Dudley was taking cores out of the web and flange of steel and iron rails and testing these diminutive specimens for their tensile strength; making comparative tests and drawing his inferences and results therefrom, and reporting to his clients the results. We carried this diminutive testing machine under our arm down to Washington street wharf to the home car and as far as we know it is in active use up to the present time.

Information Wanted—Draw-Backs or Flexible Molds, Which?

Mr. Editor: When I was an apprentice I was staggered by the problem how to mold a frog, chicken or other animal, in one piece; but the mystery was made clear to me by my being told that the animal was rammed up in the sand and afterwards burned out when the mold would be perfect for the reception of the iron. But my present query does not refer to any such childish trick, and I wish to engage the attention of practical men in order to a solution of the problem which follows. Suppose some sculptor or modeler, ignorant of molding or pattern-making, fetches in a device modeled in wet clay or plaster Paris. It may be a crown, or any other irregularly-shaped thing, perhaps having a wreath of flowers represented, and a lettered inscription in rustic design. There are a thousand under-cut places, rendering it apparently impossible to mold it in sand. Now there is a firm here in England that will cast, in iron or barss, anything; no matter how it may be under-cut, and the pattern may be of wood, plaster or clay, still, the casting will be true to pattern, and the price charged is very moderate. These castings have no joint-marks and evidently the molding is not done by the aid of draw-backs. What is the secret of the process? for it is kept secret. I have been experimenting by ramming over the pattern a flexible gelatine cover, say, half-inch thick, and over this I cast a plaster case, and when this becomes solid it is removed, the gelatine being next taken off, and as it is very flexible it slips from the mold easily and immediately resumes its shape, and when it is placed in the plaster case we have a reverse of the model. This is part of the process employed in making cheap plaster ornaments and statues. But now comes my difficulty. I proceed to cast a wax form in the gelatine mold (and in a few cases in simple forms have succeeded), then, having obtained a wax model, it is rammed up in sand and melted out, and the mold is ready to receive the molten iron or brass. The chief difficulty is to get the wax cast without melting the gelatine.

I think it possible that some reader of The Foundry may be able to give light upon this subject. I should be glad to know the composition of the gelatine used in statuary foundries. An answer through The Foundry would greatly oblige.

ENGLAND.

The Coburn Trolley Track System.

We have received the splendidly illustrated catalogue of the Coburn Trolley Track Mfg. Co., of Holyoke, Mass.

The illustrations are of both interiors and exteriors, showing the overhead tracks as arranged for carrying from one place to another within the factory, or for long distances between buildings widely separated.

The elaborate system as installed in the Granger Foundry & Machine works, at Providence, R. I., as pictured in the catalogue, is specially interesting to foundrymen; also the installations in various machine shops and warehouses. Several pages of illustrations show in detail every part of construction, and, after studying these carefully, it would be difficult to suggest an improvement.

The advertisement of the company may be seen in our advertising pages.

P. W. Gates, of the Gates Iron Works, Chicago, and ex-president of the National Founders' Association, has departed upon his European trip which he contemplated when resigning the presidency of the society.

THEIR FOURTH CONVENTION.

The American Foundrymen's Association Convenes in Pittsburg.

MAY 16th, 17th, 18th, 19th THE DATES SELECTED.

Reduced Rates Granted on All Railroads and at All Hotels.

LOCAL COMMITTEE WORKING HARD TO MAKE THE MEETING A SUCCESS.

List of Papers to be Read Will be Sent Out to All Members and Those Interested Later.

The Fourth Convention of the American Foundrymen's Association will be held in the city of Pittsburg, this year, Tuesday, Wednesday, Thursday and Friday, May 16, 17, 18, 19.

At the time of the last annual meeting, held in Cincinnati in June, '98, a very cordial invitation was presented from a large delegation present from Pittsburg, requesting the honor of entertaining the delegates and their friends at the convention which would be held this year, this invitation being supplemented by letters received from the mayor of the city, the Pittsourg Chamber of Commerce, and other industrial organizations.

At the proper time this matter was considered by the Executive Board of the American Foundrymen's Association, and by a unanimous vote, Pittsburg was selected as being the most desirable location for holding the convention this year, many members of the Executive Board thinking the selection a very happy one for many reasons, chief among these being the fact that it might, in a way, show the appreciation the foundrymen of the country entertained for the local Pittsburg Association and the work they had accomplished during the past few years.

Another reason, of course, was the appropriateness of holding this convention in the Ironopolis of America, and the facilities that would be given to foundrymen in attendance to visit the very many extensive manufacturing points located in that vicinity, many of which are of world-wide reputation.

For many weeks committees have been actively at work perfecting all the necessary arrangements for the entertainment of the large number who are sure to take advantage of the reduced railroad fares granted from all parts of the country. A very interesting program has been perfected, and the Committee report that they are not nearly through yet, and contemplate very many exceedingly interesting features which will make this convention a most memorable one both from an enjoyable as well as a practical and educational standpoint.

This program so far as is outlined by the Committee, co-operating with the Secretary of the American Foundrymen's Association, will be about as follows:

Tuesday Morning—Reception and registration of delegates and their friends, and the opening of the convention, at which time addresses of welcome will be delivered by the mayor, Mr. W. J. Diehl, representing the city. Mr. Clarence Burleigh, City Attorney, will deliver an address on behalf of the local foundrymen. It is interesting to know, at this point, that Mr. Burleigh was originally a molder, having served his regular apprenticeship at the business. These, and perhaps other addresses, will be responded to on behalf of the Association by the President, Mr. C. S. Bell. The rest of the morning will be devoted to reports of officers, together with the reading, perhaps, of one of the many interesting papers of a

technical character connected with the Association's work.

Tuesday Afternoon—The delegates and their friends will be given a trolley ride about the city and shown some of the chief points of interest.

Tuesday Evening—Two papers of an unusually interesting character will be read and illustrated by the aid of a stereopticon, which will be an interesting account of some of the recent improvements in foundry designing, erection, and plants, and foundry equipment, etc.

Wednesday Morning—Business of the Association.

Wednesday Afternoon—A train will be taken and the entire Association will be carried to Wilmerding, a few miles from Pittsburg, where they will have an opportunity of visiting the world-renowned plants of the Westinghouse Air Brake Co., famous for its many original methods of doing work, such as molding by machinery castings of an exceedingly difficult character, the structure and formation of green sand cores used in the castings for the Westinghouse cylinders, traveling platform upon which all molds are placed and carried to the cupola, after which these molds are carried through to the shaking-out point, everything as far as possible being done automatically by machinery. Many other interesting features at this foundry are the appliances for wetting the sand, riddling it, conveying it to machines and floors, core room, cupolas, and every appliance for handling raw material. This will be an exceedingly interesting and instructive visit, and one that any foundryman who has not had that opportunity already, should avail himself of. We do not believe there is a single foundryman in America who could visit this plant without receiving a good deal of information and having his eyes opened as to the successful result of constant striving on the part of the Westinghouse Company to reduce the cost of production. To those who have not seen this plant in actual operation we can only say, a revelation is in store for them, and one that would well repay a trip from any part of the continent.

Wednesday Evening—An informal reception will be held at one of the hotels of the city, and anyone who knows anything of the character of Pittsburg hospitality can readily anticipate this will be one of the features of the entire meeting.

Thursday Morning—This time will again be given up to the business of the Association, and possibly the business of the meeting may be entirely closed up at that time.

Thursday Afternoon—Delegates and their friends will be taken on an excursion to the Homestead plant of the great Carnegie Steel Co., where an opportunity of a life time will be given to many of those present to see the ponderous machinery to be found here, and the gigantic character of the work that is carried on, and witness what machinery is doing in this country as an aid in the accomplishment of results, which, a few years ago, would have been thought to be impossible. This plant has been visited by numbers of the leading iron masters of the world, and they have always gone away feeling that the systematic and skillful management of raw material as it is carried on there, is one of the most wonderful sights in the world.

Thursday Evening—An informal gathering, in all probability a smoker, will be held at some convenient point in the city.

On Friday, if there is no other business before the convention, an opportunity will be given to all visitors to visit any of the foundries or other objects of interest in and about Pittsburg, and the Local Entertainment Committee, of which Mr. I. W. Frank is chairman, will see that all possible assistance is given.

One point on which the Entertainment Committee desire to pay particular stress is that an unusual amount of attention will be given at this meeting to the entertainment of the ladies who may accompany those who attend the convention, and a special committee is at work providing a program which will keep the ladies of the party interested as long as they remain in the city.

All the leading hotels will grant a reduction in their rates to members of the convention, and no effort will be left unattempted by the foundrymen of Pittsburg to see that this convention excells all others in point of interest and enjoyment.

Let it be remembered that every foundryman, whether or not a member of the Association, will be welcome, and while the American Foundrymen's Association, of course, likes to include in its membership as many as are eligible, it will not discriminate in any character between those who are members and those who are not.

It is understood that a complete list of all papers, and an exact program of the meeting, will be mailed to all members of the Association before May 1st.

TWO EXHIBITIONS OF UNIVERSAL INTEREST.

The Fourth Convention will be memorable for having two exhibits, which alike ought to prove exceedingly interesting to every visitor.

The first will be an exhibit of everything new, original, or of value in the way of foundry equipment and foundry supplies. This exhibit is in charge of Dr. R. G. G. Moldenke, who can be addressed in care of McConway & Torley Co., Pittsburg. He has provided ample facilities for making this an especial feature, and all foundrymen who have anything of an original char-

acter which they would like to display, are cordially invited to present same and participate in the exhibit.

The second exhibit, though perhaps not as interesting as the first, will be, in the minds of many, one of the most attractive displays known to foundrymen that has ever been held at any meeting of this character. It is expected to consist in the first place of a very large number of magnificent ornamental cast iron pieces containing statuary, brackets, plates, placques, statuettes, and other articles of a similar character, imported from Russia and Germany at a great expense by one of the officers of the American Association, and to which a large number of foundrymen who take pride in the excellence of their own productions, have been invited to contribute. An illustration is given herewith of one of these, which comes from a small town in the interior of Russia, and which has been for over five months on its journey from the foundry where it was turned out, until it reached its present owner. It shows a figure of two Cossack horsemen riding in the style peculiar to their race, and dressed in the costume of their country. It is a magnificent piece of fine art, and is one that will puzzle those who see it, especially when they understand this work is made far away from the center of civilization and by molders living in a portion of the world which we in America are in the habit of commonly regarding as being much inferior to our own in skill and excellence. It is expected this exhibit will consist of several hundred pieces, and every foundryman who has anything which is of value, or is worthy of a place in this exhibit, is most cordially invited to correspond with the Secretary of this Association, Mr. John A. Penton, Detroit, Mich., from whom full particulars can be secured.

All exhibits sent to this convention will be carefully repacked at the close of the meeting, and reshipped to their destination.

Convention Notes.

None will ever regret attending this convention and ALL ARE WELCOME!

HEADQUARTERS of the convention will be at the MONONGAHELA HOUSE!

Reduced rates. All railroads will give reduced rates to and from the convention.

A full list of the papers to be read will be sent to all members in about two weeks hence.

The various committees of arrangements are working like beavers, with the object of outdoing any previous effort at entertainment of the society.

The prosperity that pertains to the whole iron business at the present time should, and no doubt will, insure a much larger attendance than ever before.

This will be an excellent opportunity for those who are not members to meet with the association under conditions that will enable them to form an intelligent idea of the society's objects and work.

The Great Free-For-All will be on Friday, when everybody will be Turned Loose, and permitted to "go-as-you-please," to visit foundries or places of interest. All doors will be open, and if anybody Gets Lost, he will be Tenderly Gathered up and returned to headquarters!

One important reason why every foundryman who possibly can should, in his own interest, attend the Pittsburg convention is that the rapid development of new conditions in the foundry business renders a general conference necessary in order to come to a common understanding as to questions of vital moment to the trade.

The names of the chairmen of the various committees are as follows: Finance, J. S. Seaman; Reception, E. A. Kebler; Transportation, F. H. Zimmers; Entertainment, Isaac W. Frank; Luncheon, Philip Matheis; Excursions, S. D. Sleeth; Printing and Badges, Robert Taylor; Exhibits, Dr. R. G. G. Moldenke; Press, Dr. Wm. B. Phillips.

Every member who has attended the former conventions will endeavor to be at Pittsburg, for the benefits derived from past association will prompt to closer union in future. The friendships formed at Philadelphia, at Detroit, and at Cincinnati, are remembered with feelings of pleasure, and all look forward with anticipation of a happy reunion at Pittsburg in May.

THE AMERICAN FOUNDRYMEN'S ASSOCIATION does not seek to effect any stipulated agreements whatever relative to business policy; but the members, many of them connected highly with the largest concerns in the country, meet upon terms of the utmost goodfellowship and discuss matters of common interest the aggregate outcome of which is a far more comprehensive view of general and particular conditions and a better knowledge of what to

do in order to get the highest profit in business.

This is preeminently a moment of organization, and that branch of industry that remains dissociated, and the individuals of which pursue the worn-out back-number methods of wholly independent action will inevitably suffer in consequence. Had the foundrymen of this country been in closer touch with each other on the first of January last not so many of them would now have been paying for dead horses, namely, by filling contracts for work taken at a price based on pig iron at $4 a ton less than what they are really paying for it!

It is hoped that many foundrymen who have never yet attended a convention of this association will be at Pittsburg. There is no other city in the United States where so many varied phases of foundry practice can be seen as in Pittsburg. All the foundries of the city will be in full operation and open for the inspection of the visitors, and the same is true of the great steel manufactories. Not only members of the American Foundrymen's Association, but all foundrymen and their friends will be welcome, and the same courtesies will be accorded them as to the members.

Belated Items.

The Eagle Foundry Company's plant at Lowell, Mass., was burned, April 7. Two horses were cremated in the fire.

The foundrymen of Utica, New York, have effected an organization embracing all the firms in the city. The objects are mutual benefit and support in all exigencies of need.

A small fire, caught presumably from sparks from the core oven, in some lumber above it, did little damage to the foundry of George Chalmers' Sons Company, at Oshkosh, Wis.

Richard McCormick had several of his toes crushed at the Farrell Foundry, Waterbury, Conn., by a shaft weighing about a ton falling upon them. Three toes had to be amputated.

The Great Western Manufacturing Company, of Leavenworth, Kansas, is building a large new foundry. It will be fitted out with jib and traveling cranes and with general up-to-date appliances.

The firm of Sullivan, Carmody & Wesley, of Holyoke, Mass., has been dissolved, and Messrs. Sullivan and Carmody will continue the business under the style of Sullivan & Carmody, Mr. Wesley retiring.

Mr. James Lowe, president of the iron foundry firm of Butterworth & Lowe, of Grand Rapids, Mich., died at his home in that city, on April 5. Mr. Lowe was born in Liverpool, England, in 1819, and was 80 years old last December.

The Basic City Car Works, at Staunton, Va., which were sold some time ago to a northern man, but who failed to come to time with the second payment, were sold at public auction April 1, and bought in by the old company for $18,000.

Articles of incorporation of the City Foundry, of Woonsocket, R. I., have been filed at the office of Secretary of State. The incorporators are: Charles E. Thomas, Fred A. Thomas, Samuel P. Cook, E. Charles Francis and Charles E. Ballou. Capital stock, $100,000.

It is reported that the Supreme Court of Rhode Island has enjoined the Builders' Iron Foundry, the Rice & Sargent Engine Co., and the Providence Steam Engine Company, from consolidating. Also, that an application for a receiver for the Providence Steam Engine Company has been made.

Ernest Marcean, superintendent of the Adams Company's Foundry, Dubuque, Ia., is on his return home from a very successful three-months' trip throughout New England and middle western States, in the interest of his firm. He reports many sales of the company's molding machines.

Ebenezer A. Hyde, formerly connected with the Chicago Foundry Company and the Bouton Foundry Company, Chicago, and with many other large concerns, has confessed insolvency in the United States District Court by scheduling debts aggregating $541,000, with no assets. All the debts were contracted before July, 1893, at which time the partnership was dissolved. A large part of the total indebtedness is in favor of John B. Hopkins, receiver of the Chemical Bank, of Chicago, which secured a judgment of $241,400 in the United States District Court in 1896.

Sale of the Somersworth Machine Company's Plant.

The attention of our readers is called to the advertisement in our advertising columns for the sale of the plant of the Somersworth Machine Co., of Dover, N. H.

Handles for Iron Flasks and Pins and Plates for Wood Flasks.

BY OSCAR OLDMAN.

Never, under any circumstances, put a wood handle on an iron flask. The heat will shrink the wood and the bolts will become loose; the iron will get spilled on the handle and will burn it in two, and in one way and another the handle will get slivered, split and broken, with the result that the flask will have to be handled by means of the handle bolts for a long time before the "powers that be" will have new handles put on; and even after repairing it will not be long till the operation will have to be repeated. If you are going to make any iron flasks, get ready for the handles before you make the flask pattern; for, if you do not, ten to one you'll have one more set of wood handled iron flasks to curse you; for when the flask pattern is finished the pressure for the flasks will be so great that you can not wait for the facilities needed in order to making iron handles, cast solid on the flask. And, if this exigency arise with you, don't put on wood handles, but just get an iron handle from a freight car door, cast a lot of handles from it, (having stopped up the screw holes with beeswax), and rivet them to the flask. This will cost less than the wood handles, in the long run, and it has the great advantage of being a first-class handle.

The handle, a sectional view of core box for which is shown at Fig. 3, is a good one in every respect and it is by far the cheapest that can be made. The core box is in

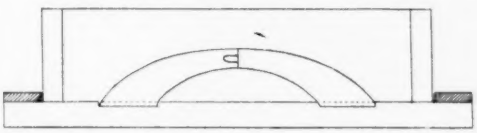


FIG. 3.

four pieces, viz: the bottom board, the surrounding frame and two horn-gates. One of these latter has a hole in the small end, the other a corresponding pin. The pin is inserted in the hole and the bases of the horn-gates are then set into the depressions provided in the bottom-board, the surrounding frame is placed in position and the core rammed up, struck off and the whole is rolled over on a plate, the bottom board removed, the horn-gates withdrawn, the frame lifted, and there stands the core ready for the oven. When ramming up the flask it is only necessary to clap one of these cores against the place where a handle is wanted, and ram it up in the mold. For round flasks the base of the core must be shaped to suit, either by making a core box on purpose for

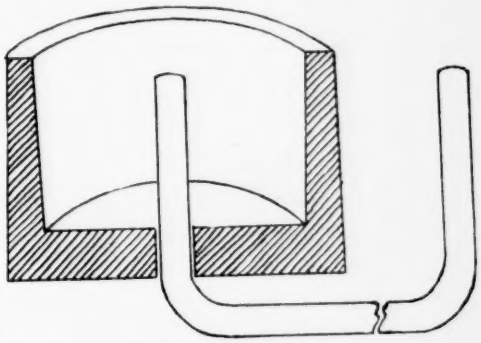


FIG. 1.

it, or by filing the core; the former plan being preferable. This handle is very strong and seldom gets broken, as a heavy blow on the handle is more apt to break the flask, except the latter be very heavy.

Fig 1 is a section of another kind of handle core, with a wrought iron handle inserted. With another core on the opposite end of the handle, the whole is set in position against the side of flask pattern, and rammed up in the mold, the result being a wrought iron handle attached to the flask by cast bosses. This is the neatest and best handle made, and is absolutely unbreakable. The cost is a trifle more than that of the cast handle, but it is well worth it.

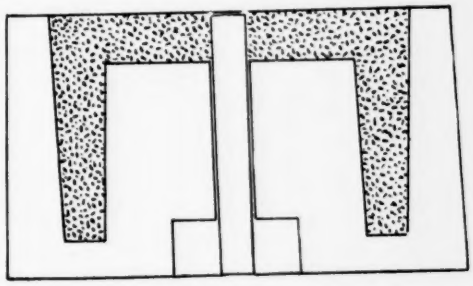


FIG. 2.

Fig. 2 is a sectional view of iron core box for this handle. The box is in one piece, but the hole is made in the center by means of the steel pin, as shown. Ram up the core, strike, and roll on to a plate, then, after rapping hard with a mallet, withdraw

the pin and then the box. The depression in the bottom of box is to enable the workman to get hold of the pin to withdraw it.

To make this box, first have the pattern-maker turn a wooden core exactly as you want the sand core to be with the exception of the center hole. Give it several coats of varnish, rubbing it down smooth each time, and especially after the last coat; then, paint it with oil and plumbago, lay it on an oiled surface, fence around it, and make a plaster cast upon it. Remove the wood core, and trim the outside of the plaster cast to suit, and you have a perfect pattern from which to make the core-box.

PINS AND PLATES.

The illustrations show three different styles of pins and plates for wood flasks. Fig. 1 is a plan, and Fig. 2 a section of

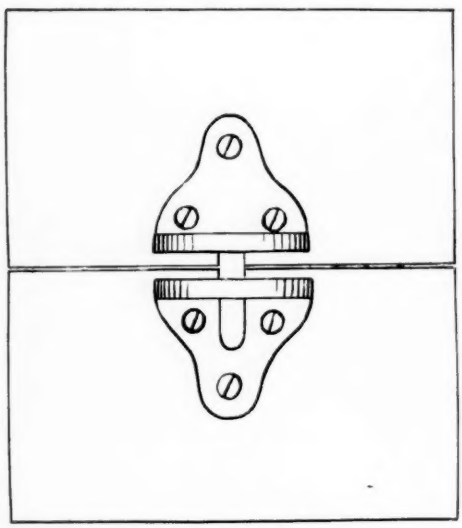


FIG. 1.

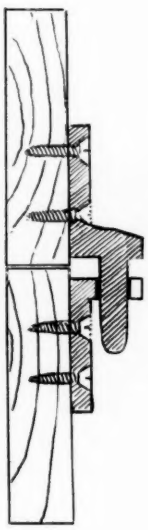


FIG. 2.

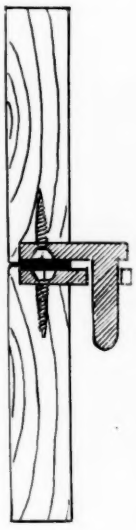


FIG. 3.

FIG. 4.

what the writer considers in every respect superior to anything else he has ever seen. Fig. 4 is, perhaps, the earliest style of cast pin used, and it is still employed exclusively by some foundries. The pin and plate are set in the joint of the flask. The hole through the plate is extended down in the wood beneath to some distance below the reach of the end of the pin when the flask is closed, and an intersecting hole is bored from the outside of the flask. This lateral hole provides means for removing any sand that may get into the pin-hole. It is a stronger device than Fig. 3, but a serious objection to it, and one that renders it less desirable than the latter, is the fact that it is out of sight when the flask is being closed. Again, if the iron run out at this particular place, it is apt to run down into the hole, in which case, it is difficult of removal, and furthermore the joint of the flask being burned, the screws become loose and re-setting in a new location is necessary; and, as is well known, this kind of repairing is usually deferred till frequent losses compel attention to the cause.

Fig. 3 represents the style of pin in most general use. It is the immediate successor to Fig. 4, and is an improvement upon it in that it is in plain sight at all times, rendering it easy to guide the pin into the hole when the cope is being closed on, and having the further important advantage that the hole in the plate is always clear, as anything that shall fall into it will pass on through and fall to the ground. But it is weaker than Fig. 4. It is very defective in this respect, for, if the cope be dropped upon the drag, in setting away the flasks, or piling them when shaking out, and the point of the pin miss the hole and strike upon the face of the plate, as often happens, the weight of the cope, applied to such a leverage, will start the screw from the wood, and thus we have a loose pin, the result being that, when we start to raise the cope, the pin tips, as far as the "play" in the plate hole will permit, sticks, and you have to call for a man to fetch a clamping-iron to pry it

up before the cope can be lifted. Another serious fault with this plan is that a "run-out" will burn it loose, just as in the case of Fig. 4. And, even where no "run-outs" occur, the burning of the gases at the joint will sooner or later cause the screws to become loose, and the pins must then be reset, in a new location. And here arises another difficulty, viz: the joint of the flask has frequently become so badly burned that it is almost impossible to find a point where a good seat can be secured for the pin. The pin represented at Figs. 1 and 2 possesses all the good features of the others, besides qualities of merit peculiar to itself, and it has no objectionable feature whatever; in fact, it is in every way perfect. I hasten to assure the reader that it is not of my invention, and that it is free to any who may wish to use it.

As the illustration shows, the screws that hold the pin to the flask are far removed from the joint and therefore will never become loose from burning, as the joint of the flask may be all burned away without interfering with them. There is no sawing and chiseling of the flask necessary in order to provide a seat for this pin, as it is clapped directly onto the end of the flask and screwed to position. With the other styles, care must be taken in order to be sure that the pin, and the paralel sides of the plate hole shall be at exactly right angles to the plane of the flask joint; but in adjusting this pin no attention is required for this, except to guard against their leaning sidewise while fastening them to the flask. In using this style of pin, the plate at one end of the flask should have a round hole, and at the opposite end it should be slotted, in which case the only thing required is to screw the pins and plates to the ends of the flask and the job is done.

This pin has a still further advantage over the others, and that is, if by any chance they become loose, you can drill through the flask at the screw holes and fasten them on with bolts.

Pins for Iron Flasks.

To the Editor:—The articles on Flask Pins in the February issue of THE FOUNDRY were especially interesting to me just now as we are making some new iron flasks; and it has occurred to me that I might be able to say something upon the subject that would interest some of your readers.

Neither the design of the flasks nor the method of constructing them is original with us, but the method of affixing the pins is a good one, whether original or not, and I have never seen anything of the kind elsewhere. It became necessary that we should have some flasks that would not burn out so easily as wooden ones, and, not being a fancier of iron flasks as commonly made, I hesitated about making them.

We have had more than enough of experience with pins cast solid on iron flasks, both round and v-shaped, and we simply would not have them. Our flasks are made of cast plates bolted together at the corners. The side plates are 1-4-in. thick, with a flange the whole length at the edges, 3-4x5-16-in., for the cope, the nowel having simply a stiffening rib along the middle of the plate. All bolt holes for bolting together at the ends, for bars and handles (the latter being of wood), as well as numerous holes for lightening, and to afford vent, were cast in the plates. The end plates are scant 3-8-in. thick, and have no flanges except at the end, for bolting to the sides.

These flanges have good draft on the inner side but none on the outside, so that the sides may be bolted on tight without springing. There are three holes cast in these plates, one for the bolt wherewith the pin is attached, and two to receive the bosses that are cast on the seat of pin. The plate was made without bosses, so that we might cast it with the pin hole. To keep the plates from turning, angle ribs are cast on the end piece at a distance apart corresponding to width of plate seat. The holes in the end flanges are drilled to receive 3-8 in. bolts. To mark these holes for drilling we set up the sides and ends in correct position on a level board, with the result that when bolted together the flasks were perfectly true, the copes and drags fitting together without rocking. There was no fitting required in attaching the pins and plates, and when one of the pins got broken the other day, another was substituted in the time required for unscrewing a nut and screwing on another in its place, and it fitted without any adjusting.

The bolt holes in the bar patterns were cast in, and the bars can easily be removed to permit of such substituting wooden bars for special jobs. The only fitting about these flasks was in the drilling of the bolt

holes in the end pieces; the gangway "mechanic" did the rest.

I prefer the mitered joint at the corners, but they are more expensive as to pattern-making, and in putting the flasks together, as the bolt holes all have to be drilled; but when finished they are more rigid, and they look right.

I wish to say a few words about a certain kind of pin that we have used on large iron flasks. This pin is of steel, taper-turned to fit in a taper hole in the flange at the bottom of cope; and holes slightly larger than the pin are drilled in the flange of the drag to receive them. Tap these pins down lightly with the hammer and they will remain rigidly in place till you wish to remove them. After the heat is off, go round and withdraw all the pins, and put them in your tool box. Their absence will be appreciated when you come to shake out the molds. They should fit the hole in the cope flange so that when in place they will project above about ½ inch to enable you to take hold of them in withdrawing.—T. W. H.

How Molders Should Treat the Foundry Foreman.

BY SETU WRIGHT.

Referring to the article by C. Ritic, in the February issue of THE FOUNDRY, he asserts that he has worked for many varieties of the genus foreman, including the Bulldozer, the Driver, the Ignoramus and the Gentleman. No doubt there are examples of the characters enumerated, but it is quite probable that some of the less amiable ones would have been creditable foremen from everybody's point of view had the men given due consideration to the peculiar position which the foreman occupies between the employer and the men, and I think that the author would have given us an article of much greater value to the general reader if he had assumed a position less antagonistic to the foreman.

How often men have taken charge of foundries without the least sinister disposition toward the men, only to find, on becoming familiar with the work that the molders, and not himself, were running the shop, though he must answer for results. He perhaps finds that several of the molders are killing time badly, not doing anything like a fair day's work, and he does his simple duty when he asks them to increase their day's work. In some cases the molder will refuse, on the plea that what he is doing has been the regular day's work on that job for years past. But, perhaps, one or more of the molders will accede to the request, whereupon the shop committeeman takes a hand in "improving" the foreman's disposition by "calling down" the honest workman, and by threatening to prefer charges against him at the next meeting of the Union, if he persist in doing a fair day's work. There would be less complaint of bulldozers and drivers if the workmen would show proper consideration toward the foreman, and would interest themselves in the welfare of the concerns that employ them. In contrasting the two St. Louis foundries, Mr. C. Ritic no doubt gives the conditions to the reader as he found them, but it would seem that he lacked sound judgment in making up his comparisons and deductions therefrom, and perhaps the treatment received in foundry No. 2 made him sore on it. It is not stated whether the owner of the second foundry cited was, like the owner of the other, a millionaire, but probably he was not, or he would not have felt obliged to employ incompetent men at comparatively low salaries as foremen, but on the contrary, he would probably have employed a competent man regardless of the amount of salary, thereby avoiding the necessity for such frequent changes.

With a foreman who would spend his time in sleeping behind a pile of flasks or sitting in a saloon, the selfish molder would indeed have a "cinch," as he could pursue his own pleasure without fear of the watchful eye of a competent foreman to prevent him from doing wrong.

I think it would be well for some fair-minded molder to write an article on "How Molders Should Treat a Foreman," to counterbalance the evil effect that may have been produced by C. Ritic's article.

I have known many good foremen to turn out "holy terrors" through no fault of their own, but through the perversity of the molders themselves in totally disregarding the interests of the business. A firm, in order to get the renewal of a contract, may have to bid lower than formerly, and in that case it will require of the foreman that he find means for reducing the cost of the product,

under which circumstances it is not calculated to improve his temper to find the molders all hanging back, killing time and generally refusing to co-operate with him for the general good.

If I may be permitted to advise, I would suggest that molders, when they go to the shop in the morning, determine to produce a day's work that a reasonable foreman can accept, and at the same time to see to it that their castings are all good, and of an excellent quality.

The reading of such an article as Mr. C. Ritic's has given us is not calculated to make a molder anxious to improve the conditions of the factory in which he works.

The kind of article that would really benefit is that which states the real position of the foreman between the employer on the one hand and the workman on the other. It is the misfortune of many foremen to get "keel-hauled" for the misdoings of the men under him, and if, under such circumstances, he speak a cross word, or "call down" a culpable molder, he is characterized by the name of "bulldozer" or something else no less opprobrious.

In closing, I am glad to state that I fully indorse the sentiment expressed in the last paragraph of Mr. C. Ritic's article.

Malleable Iron Mixtures.

BY EDWIN L. GROVER.

Malleable iron after being cast, as is well known, is extremely hard and very brittle, and is known as "white iron," from the color of fracture.

The castings are tumbled in the usual way, before being annealed, in order to prevent the sand from being burned into the iron. Occasionally a casting is so fragile that in order to prevent its breaking it is pickled or sand-blasted. They are then sent into the trimming room, where they are inspected, gates chipped off, and a record made of them, after which they are turned over to the annealing room. Here they are placed in "pots," consisting of square or oblong cases piled upon each other to nearly the height of the arch in the annealing oven. The pots have but one bottom, hence castings of any length, not exceeding height of pot, with a small allowance for a covering, can be annealed in them. The castings are surrounded with a "packing" of scales from rolling mills, or something of a similar nature. It was at one time the universal custom to rust or oxidize this packing, by wetting it with diluted sal-ammoniac. This was done, on the theory that the casting would become decarbonized by the oxygen in the packing combining with carbon in castings. This may occur to some extent, but as a matter of fact an analysis of the annealed iron will show a big proportion of the original amount of carbon still present, but instead of being in the combined state it will be present as graphite. Hence the explanation of the annealing process seems to be this—the carbon in the white iron is in chemical combination with the iron, thereby causing it in some way to be hard and brittle. We presume each atom of carbon to be surrounded completely by other atoms or molecules of iron. By heating this "ferro-carbon," and allowing it to cool slowly, the carbon changes its nature, turning to graphite, thus losing the detrimental affinity it has for the iron, or in other words, its hardening and brittle making properties. The graphite then remaining is not, as in gray iron, grouped in crystals breaking up the mechanical or physical structure of the iron, but each atom is isolated in a cell of iron. Hence many manufacturers do not rust their packing, depending simply upon the effect of the heat.

After being packed, the pots are run into the oven, which has previously been fired lightly, by means of a specially constructed truck. The firing is then increased until the oven and its contents show a bright cherry heat. It is kept up thus from three to seven days, and then gradually slackened for several hours. The doors are then torn down, after which pots are "drawn" from furnace, and allowed to slowly cool. They are then "dumped" on floor, the castings picked out and again sent to the tumblers to have the packing adhering to them removed. The pots are placed to one side and the packing, which has gone lumpy during the process, is hammered and riddled to its former state of fineness.

The castings are now delivered to shipping room, where they have to all be assorted.

One can readily see that each casting has to be handled a great many times, and these numerous handlings bring the cost of light work very much higher than heavy. A shop making heavy work, such as used on railroads, can easily produce six times the tonnage of a shop making light work, such as saddlery hardware for example, and with a much less working force.

Among the Foundries.

William Schofield is erecting a foundry at Philadelphia, Pa.

The demand for molders throughout the west is greater than the supply.

A project is said to be on foot to establish a steel casting plant at Peru, Ind.

The Colton foundry, Galesburg, Ill., which was recently burned, will be at once rebuilt.

L. Goodenough & Son will build an addition to their brass foundry, at Bristol, Conn.

Malcolm McLane, proprietor of a foundry at Marlboro, Mass., has assigned to A. W. Hastings.

The old Borchers foundry, Dayton, O., is undergoing repairs preparatory to being set in operation.

The Emerson Manufacturing Co., of Rockford, Ill., will build a new foundry the coming summer.

The Dayton furnace and foundry plant, Dayton, Ohio, has been sold to Mr. Ezra Bimm for $8,000.

The Jeffrey Manufacturing Co., of Columbus, Ohio, will erect a new foundry, which will contain two cupolas.

G. S. and W. W. Humes and G. Z. Sheriff have organized the Mercer Machine & Steel Casting Co., at Mercer, Pa.

The American Radiator Company, of Chicago, has bought the M. Steele company's plant, at Springfield, Ohio.

The new owners of the old Brainerd foundry at Hyde Park, Mass., will erect an 80-foot extension to the building.

Colonel C. H. Castle, of Keokuk, Iowa, will build a foundry 104x108 feet, at a cost for the plant of $7,000 to $10,000.

A new foundry, equipped with modern facilities, will be built for the Columbia Foundry & Machine Co., St. Joseph, Mo.

The Watson Foundry Co., Cleveland, O., assigned March 6, to D. C. True, with liabilities of $6,000 and assets of $4,000.

The foundry department of the Roberts Machine Company, at Collegeville, Pa., is to be enlarged by an addition 24x72 feet.

It is reported that the Victor Metal and Foundry Company, of East Braintree, Mass., contemplate removing to Newport News, Va.

The Economy Foundry of Syracuse, N. Y., will hereafter employ only union men, having agreed to this with the iron molders' union.

Mr. and Mrs. Frank Chaffer have sold their interests in the foundry of Hildreth & Co., Lansing, Mich., to the Hildreths, for $1,500.

The Goodsell Iron Works, at Ludington, Mich., have closed; the stock, machinery and fixtures having been sold to Wickes Bros., of Saginaw.

J. N. Bronson, whose foundry at Stillwater, Minn., was burned, has completed repairs to the buildings and the foundry is again in operation.

The Bath Iron Works expects, with the advent of warm weather, to increase its force of men from the number at present employed, 750, to 1,200.

John Kelly has brought suit to recover $10,000 damages from the American Steel Foundry Co., Granite City, Ill., for injuries received in an explosion.

The English Engine & Supply Co., formerly of Kansas City, Mo., is now running a general jobbing foundry in the old stove shops, at Leeds, Ia., a suburb of Sioux City.

N. S. Sherman, of Greenville, Texas, will build a foundry and machine shop at that place. He will manufacture combined corn and cotton planters.

F. E. Thomas, of Sedalia, Mo., has bought land, and will build and operate a foundry at Corbin City, Kan. He will employ about twenty-five men.

The Middlesborough Foundry & Machine Works, at Middlesborough, Ky., has been bought by C. P. Perrin, general manager of the Virginia Coal, Iron & Railway Co.

The report that Pawling & Harnischferger, Milwaukee, Wis., would erect a foundry, proves to be erroneous. They are building an erecting floor and machine shop addition.

Cast iron fronts for five handsome brick business houses are being erected in Marion, Ill. This does not look as if cast iron had gone wholly out of favor for structural purposes.

The plant of the Hanover Foundry & Machine Co. of Hanover, Pa., was sold March 8, to Vincent Obold, for $17,500, by the receiver. The plant was formerly capitalized at $50,000.

The Lehigh Valley R. R. Co.'s foundry at Weatherly, Pa., has been closed for good, and the work will be done at their other shops hereafter, the result of a policy of concentration.

The Washington Coal & Coke Company, with sales offices at Conestoga building, Pittsburg, has let the contract for the building of 150 coke ovens at Star Junction, Fayette county, Pa.

The new foundry and machine shop buildings of the Niles Boiler Company, Niles, Ohio, are nearly completed. A large building, to be used as a pattern shop, will also be erected at once.

Graff & Co. of Pittsburg, have removed their stove manufactory from Sharon, Pa., to Monongahela City, Pa., and some Pittsburg parties think of starting up a foundry business in the old plant.

The Cleveland Crane & Car Co., recently formed, succeeds to the crane business of the Phoenix Iron Works Co., and of the Cleveland Punch & Shear Works. The company occupies the old Phoenix plant.

A deal has been closed by the Stock Lubricating Co. of Chicago for the purchase of Dr. Northrop's foundry and machine shop at Port Huron. The plant will be enlarged before the new company takes possession.

Mr. Kavanagh, late general manager of the state foundry, and Capt. Nat. M. Harrison, late assitant financial agent, and some half dozen other leading citizens, will erect a foundry at Rusk, Texas, at a cost of $15,000.

The Sharpsville foundry was sold March 16 to James V. Rose, of Sharon, Pa., for $2,900. Mr. Rose will at once add modern improvements and put the foundry into operation. About 75 hands are employed in the plant.

The Belle City Malleable Iron Co. of Racine, Wis., whose plant was burned some time ago, has finished its new plant, and the works are running full, having to run four nights a week to keep somewhere near up with orders.

E. M. Burr & Co. succeeds the firm of Robinson & Burr, of Champaign, Ill., and the business will proceed under favorable auspices, with a probability of both the foundry and machine shop being enlarged branches in the near future.

For the water pipe contract for the city of Cleveland, O., the Addyston Co. bid $22.10 per ton, the Lake Shore Foundry Co. of Cleveland, $18.90. Last year the Addyston Co. furnished the pipe for Cleveland at $14.93 per ton.

The stockholders of the Auburn Stove Foundry Company, after a long and fruitless endeavor to make the business pay, have petitioned the courts for permission to dissolve the business.

Messrs. George Wood, Thomas M. Dundon and John Flanigan, of Erie, Pa., will remove to Conneaut, Ohio, where land and other inducements have been given them by the Conneaut board of trade, to build and operate an iron foundry.

The Fairview Manufacturing Co. is the style of a new incorporation at Fairview, Ill. The concern will manufacture malleable iron and brass specialties. Incorporators, T. T. Wood, of Racine, James Crook and William Cowell.

A newspaper report is to the effect that, after April 1, all work in the foundry at Plantsville., Conn., of the Peck, Stow & Wilcox Company will close, and the casting will hereafter be done at the company's foundry at Southington.

It is reported that the R. D. Cole Manufacturing Co. of Newnan, Ga., contemplate removing their foundry plant to Birmingham, Ala., in order to be nearer the iron and coal supply. The plant represents an investment of a half million dollars.

At the annual stockholders' meeting of the Warren Foundry & Machine Co., Easton, Pa., on March 13, the following directors were elected: James W. Long, Wm. Runkle, H. G. Runkle, John S. Riegel, W. H. Hulick, E. J. Fox and A. D. Chidsey.

It is reported that a company of New York capitalists is buying up the idle furnace plants of the south, which were built during the boom of a dozen years ago, and have not been run for many years past, with a view to putting them into immediate operation.

F. W. Oberbeck, owner of the New Athens (Ill.) foundry, contemplates retiring from the business and turning the plant over to his son Fred. The latter has asked the employes to become stockholders in the concern but no decision has yet been reached.

On March 8 Judge Ermentrout made an order terminating the receivership of the Reading Foundry, Limited, Reading, Pa. The receivers were appointed a year ago. Since then business has improved, and the property will be transferred to the company. The industry employs 700 hands.

The Dexter Folder Company, of Pearl River, New York, are opening a foundry in connection with their machine shops. They employ about 150 hands, and are among the leading manufacturers of folding and feeding machinery. They report having a fine export demand for their machines.

On March 8, A. T. Wilkinson, as referee, sold the old stove foundry of J. S. & M. Peckham to Carleton G. Lowery, for $8,000, he being the only bidder. The foundry is one of the oldest manufacturing buildings in the city of Utica, N. Y. The purchaser, Mr. Lowery, held a mortgage on the plant for $20,000.

Charles E. Dyer was "mending" a casting by "burning in," in the Economy Foundry, Syracuse, N. Y. The casting was damp, an explosion necessarily resulting, from which Dyer lost an eye. He sues the company for $10,000 damages, charging that there was a leak in the roof, through which the water had dropped upon the casting.

The Radford Pipe & Foundry Plant, at East Radford, Va., has been sold to a company made up of Philadelphia and Roanoke capitalists, and will be put in operation at once. The majority of the stock is held by Cincinnati people, who operated the plant for several years. The plant originally cost half a million dollars. It employs about 800 men.

The Sieben Manufacturing Company has been incorporated at Kansas City, Mo., for the purpose of manufacturing brass and iron castings. Captal, $10,000. Officers: Henry Sieben, president; Frank Mervin, vice-president; Dent. Yates, secretary, and B. Howard Smith, treasurer. The two-story brick building will be 50x150 feet, to cost $6,000.

The Shickle, Harrison & Howard iron foundry is to be removed from St. Louis, Mo., to East St. Louis, Ill., as the result of difficulty in securing railroad accommodations at the present location, and of the bonus of fifteen years' exemption from taxation offered by the Illinois village trustees. The ground site has been purchased for $26,000. The same land was bought five years ago for $10,000.

The Pittsburg Steel Company has just been organized, with a capital of $250,000 (which can be doubled if necessary). They will build a steel foundry at Glassport, to be equipped with four twenty-ton furnaces and ten electric cranes. Mr. Stewart Johnson will be at the head of the concern, which is composed of some of the large capitalists and business men of Pittsburg. The output will consist of steel castings of every description.

An unaccountable explosion, during a heat, occurred in the cupola at the works of the Wilmington Pipe & Foundry Co., Wilmington, Del. The bottom was forced downward, bending the supporting bar, the tuyere pipes were shattered and hurled in various directions, this being the extent of the damage. Nobody was hurt, though so great was the force of the explosion that the report was heard several squares away.

[We incline to the opinion that somebody had shut off the blast without opening a vent.—Ed.]

It is reported that before the first payment was made for the properties constituting the American Car & Foundry Co. (which occurred a few days ago, and amounted to the merely nominal sum of $17,000,000!) a year's dividend had already been earned on the preferred stock. If this is true, it won't take that company long to "earn" all the remaining wealth of the country. Possibly we shall have to revise the meaning of the word earn, or else some other word will have to be employed to designate the gettings of this particular trust.

Charles S. Prizer resigned on March 2 as president of the Reading Stove Works, Reading, Pa., an office he had held since 1892, and became president and general manager of the Prizer & Painter Co. of Reading, a company he has recently formed. Mr. Prizer has associated with him in this company Enoch T. Painter, Ralph L. McCall and Alexander T. Henderson, who have been respectively superintendent, treasurer and heating engineer of the Reading Stove Works. They have a well equipped foundry plant in that section of Reading known as Millmont, the present capacity of which is 75 molders, but it can be enlarged to the capacity of 200 molders.

Representatives, consisting of officers of the Iron Molders' Union of North America, and of the National Founders' association, met, March 8, and discussed principles of arbitration for the settlement of all future disputes. The plan as agreed on will be submitted to a referendum vote of both organizations. The representatives of the employers were O. P. Letchworth, of Buffalo; G. E. Emmons, Schenectady; H. C. Caldwell, Brooklyn; L. E. Bellows, Holyoke, Mass.; Edward Maher, Newark; Charles Patterson, Cleveland, and H. M. Leland, Detroit.

On the part of the molders were Martin Fox, president of the I. M. U. of N. A.; David Black, Cincinnati; W. A. Perrine, New York; William Dawson, Brooklyn; James S. Flanagan, Elizabeth, N. J., and William John, of Boston.

We have received a circular letter from the Chicago offices of the United States commission to the Paris Exposition of 1900, signed by John H. McGibbons, director of exposition, and approved by Ferdinand W. Peck, commissioner-general, requesting all would-be exhibitors to make it known immediately if they have not already done so, in order that they may be considered in the allotment of space which will soon be made. We quote from the circular: "While there are many applications on file in every line of industry, it is desirable that the American sections be not only representative of this country, but also representative of the largest possible number of producers. Both our commercial interests and national pride demand that our works be entered in this most important international exposition. It is estimated that fully 60,000,000 from every part of the globe will attend, and it will be an opportunity to greatly increase our foreign trade and to demonstrate that the United States is supreme in the arts of peace."

Stove molders have secured an increase in wages of $1.80 to $3 per week, the minimum wage of a molder to be $3 a day and the maximum $5. The increase is to 15,000 stove molders and means an addition of $43,000 a week to the pay rolls of big stove firms of the country. The price of stoves will be immediately raised 10 per cent, an addition to a recent 10 per cent increase in price.

These results were secured by a conference held at the auditorium between representatives of the Iron Molders' Union of North America and the Stove Founders' National Defense association, the latter including 90 per cent of the stove factories of the country. Those who represented the manufacturers at the conference were C. H. Castle, Quincy, president; Henry Cribben, Chicago, vice-president; A. Ciltott, Philadelphia; E. W. Peck, Rochester; George W. Holland, St. Louis; Jeremiah Dwyer, Detroit. For the molders the representatives were Martin Fox, Cincinnati, president; Thomas Carr, Chicago; W. C. Gray, Quincy; David Black, Cincinnati; M. Monohan, Albany; M. O'Neil, Detroit.

New Buildings and Enlargements.

Work has begun on the new Hubbell foundry, at Pittsfield, Mass.

An addition has been erected to the Hodge foundry at Greenville, Pa.

The Wilmington (Del.) Malleable Iron Co. is enlarging its plant.

Pierce, Butler & Pierce are building a foundry at Eastwood, N. Y.

Snyder & Baker are building an addition, 50x100 feet, to their foundry at Belleville, Ill.

A new foundry building is to be erected at the Hainesport Iron Works, Hainesport, N. J.

A brass foundry is to be added to the Robert Faries manufacturing plant at Decatur, Ill.

The Whitney Automatic Pump Co. of Detroit, Mich., has filed articles of incorporation. Capital, $300,000.

The Coleman Hardware Co. contemplates erecting a $50,000 brass foundry addition to their works at Morris, Ill.

The Titusville Iron Co., Titusville, Pa., will erect a new foundry and machine shop, to be finished by Sept. 1.

Wm. Schofield is building a 26x84 feet foundry at Philadelphia, Pa., on Kram's avenue, east of Wilde street.

An addition is being erected to the brass foundry of the Muller Mfg. Co. at Decatur, Ill. It is to be of brick, 50 feet square.

The H. W. Caldwell & Son Co. of Chicago will erect a $50,000 foundry machine shop and warehouse, constructed of brick.

It is reported that the Columbia Foundry & Machine Co., of St. Joseph, Mo., will soon erect an immense new foundry in that city.

The Cleveland Foundry Co., Cleveland, O., capitalized at $200,000, is authorized to do business in Illinois with a capital of $5,000.

Henry E. Pridmore, Chicago, will build a new foundry, 60x150 feet, with steel roof; also a machine shop, 60x100 feet, two stories high.

The W. D. McNaull Foundry & Machine Co. of Huntington, W. Va., will remove to St. Albans, where they will erect an entire new plant.

The West Penn. Foundry & Machine Co. of Avonmore, Pa., is building a pattern shop 35x50 feet, to replace the one recently burned.

The Union Malleable Iron Co. of East Moline, Ill., will build new shops, 522x900 feet. Of this area the foundry will occupy 408x150 feet.

The Lloyd-Booth Co. of Youngstown, O., manufacturers of rolling mill and tin plate machinery, has recently installed a 15-ton traveling crane.

The Vulcan Iron Works of Tamaqua, Pa., which have been idle for over a year, will resume operations, having contracts ahead for a year's business.

Black & Gloninger have sold a 15-acre tract of land in Glassport, Pa., to a company which purposes to erect a large foundry and machine shop.

C. F. Springer, Albert H. Pulney and Percival Steele are the incorporators of the United States Steel Castings Co. of Chicago, Ill. Capital stock, $400,000.

H. W. Longfelder, Leonard Meyer, H. C. Bodman and Ben. Taylor are the incorporators of the Eclipse Foundry Co., at Belleville, Ill. Capital stock, $6,000.

Additions to the value of $100,000 will be made to the car works at Madison, Ill. The foundry will be greatly enlarged, and new engine and boilers will be installed.

Charlie Parker is building a foundry in Abilene, Kan. It will be 30x50 feet. He will also enlarge his warehouse by an addition, 30x30 feet, two stories high.

The Fowler Radiator Co. of Johnstown, Pa., will increase its capital stock from $25,000 to $50,000. The Waters Bros. will continue to hold a controlling interest.

A new machine shop and foundry will be erected this spring for W. E. Schaefer, at Fond du Lac, Wis. The structure will be 140x60 feet, with an annex 30 feet square.

The Steele plant, at Superior, Wis., has been purchased by the United States Cast Iron & Foundry Co., and extensive additions will be made to the plant immediately.

The Pittsburg Plate Glass Co. is building a large foundry at its works, Ford City, Pa. It will be of brick and steel, and will be equipped with complete modern appliances.

It is reported that W. M. Newkirk, a draughtsman, and several other young men of Detroit, will operate a foundry in a part of the old car shops at the foot of Adair street.

A new foundry is to be operated, it is reported, in the location formerly occupied by the Buckeye Foundry Co., Cincinnati, by men formerly connected with iron founding in the city.

The Filer & Stowell Co. of Milwaukee, Wis., will build so as to double the capacity of their foundry. For the last month they have had to refuse more orders than they have been able to accept.

The Gates Foundry Co., at Wilkesbarre, Pa., has torn down its old foundry, and will erect instead two brick structures, 40x40 and 40x32 feet respectively. These will be supplied with modern equipment.

The American Car & Foundry Co. is making extensive improvements to its purchase, the old Ensign car works, at Huntington, W. Va. More than $30,000 will be spent on planing mill and foundry alone.

The new power house at the foundry of Henry R. Worthington, at Elizabethport, N. J., will be equipped with new engines, electric plant, tube boilers and air compressors. The installation will add 50 per cent to the present capacity.

The New England Foundry & Machine Co. of Jersey City, N. J., has been incorporated to manufacture special machinery, tools, etc. Capital, $100,000. Incorporators: Chas. F. Hoyt, New York; Charles E. Selden, Middletown, N. Y.; R. H. Desmond, Crawford, N. J.

The Dexter Manufacturing Co., of Salem, O., which has been having many of its cast-

ings made at the Silver foundry, will put in molding machines, thus increasing their capacity so much as to enable them to make all their own castings in future.

At a recent meeting of the directors of the Monroe (Mich.) Foundry & Furnace Co., it was decided to increase the capital stock $5,000. The company also intends to erect a large two-story brick building in the near future, as their business is getting beyond their present capacity.

The Brass Foundry Co. is the name of a newly organized corporation at New Haven, Conn. Capital stock, $10,000. Incorporators: T. W. Corbett, Albert E. Holaday, Clinton M. Pettis, George E. Haight, trustee, Simeon J. Fox, trustee, Levi T. Snow, Thomas Chadwick, John A. Brown, Thomas E. Burns.

The certificate of incorporation of the Eclipse Foundry Co., recently organized at Belleville, Ill., has been filed for record. The capital stock of the new company is $6,000 and the incorporators are H. W. Lengfelder, Leonard Meyer, H. C. Bodemann and Ben. J. Taylor. The company will occupy the shops formerly run by the Standard Foundry Co. north of the L. & N. depot.

The Freeland Manufacturing Co. of Niles, Mich., has filed articles of association with the county clerk. The concern has a capital stock of $10,000, with $1,000 paid in, and there are 1,000 shares. The company is established for the purpose of manufacturing wind engines, feed cookers, steel tanks, tank meters and specialties in iron and steel. A foundry and machine shop is to be operated in connection.

A new corporation, at Seattle, Wash., to be known as the Seattle Brass & Bell Foundry Co., has been organized for the purpose of manufacturing brass goods for water, gas and steam works; also a general line of machine work and repairing.

The incorporators are H. Lutsch, M. W. Ryan, formerly proprietor of the Seattle Brass & Bell Foundry, and George G. Thayer. The capital stock is placed at $3,000. The officiers are Herman Lutsch, president and treasurer; M. W. Ryan, vice president and manager, and George A. Thayer, secretary. The company will make a specialty of copper, brass, zinc, babbit metal and aluminum castings.

The Pittsburg Plate Glass Co. has begun the erection of one of the largest and finest foundries and machine shops in the country at its Ford City works. This structure will be of steel and brick, will be fireproof and will cover an acre or two of ground. It will cost $100,000, not including the machinery, which will be taken from the old Howard plate glass plant. It is calculated that the new foundry will result in large savings in the way of machines and repairs.

The Cook Automatic Gas Machine Co. has filed articles of incorporation in the county clerk's office at Sacramento, Calif. The purpose of the company is to manufacture, sell and distribute acetylene gas, gasoline and other gases, and conduct a general machine and foundry business. The principal place of business is Sacramento City, and the directors are: E. R. Cook, W. A. Desborough, G. Willmunder, E. Kunz and Charles O. Busick. The capital stock is $50,000, divided into 10,000 shares of $5 each. The amount of capital stock subscribed is $30,800.

The Anniston, Ala., Pipe & Foundry Co. is making extensive improvements to its plant, including the erection of three new buildings, a storehouse 25x60 feet, pump house and blacksmith shop, 40x60 feet, and a testing or proving shed. Included in the new apparatus and equipment that is being put in are three hydraulic presses, a new set of pumps, 75-ton accumulator, new tar tanks and new ovens. Pit No. 6 is being fitted up and will be put in operation at once, making six pits, or the total capacity of the plant in use. This additional pit will increase the output of the plant 40 tons per day, making the output of the entire plant 230 tons daily. The extensions will give employment to 80 additional operatives, increasing the force to about 600 men.

At a meeting of the stockholders of the Westinghouse Machine Co., held in East Pittsburg early in March, it was decided to increase the capital stock from $1,500,000 to $3,000,000. The increased capital will be used to facilitate the operations of the company on a much larger scale than at present. Work will soon be commenced on the erection of new buildings and the installation of equipment to double the present capacity of the works in East Pittsburgh. The company will engage in the manufacture of large rolling mill engines.

and to do this have placed orders for some of the heaviest machinery equipment ever built. Heretofore this concern have confined themselves largely to the manufacture of medium sized engines, but it is their purpose to make engines of the heavier type.

Fires and Accidents.

A small fire at the Pacific Iron Works, Bridgeport, Conn., caused a loss of $200; fully insured.

Fire at Dobbie & Stuart's Foundry & Machine Works, Thorold, Canada, caused a loss of $10,000.

Patrick Murray, melter at the Century Stove Foundry, Dighton, Mass., was badly burned on the leg March 9.

The Colton foundry, Galesburg, Ill., was destroyed by fire March 8, entailing a loss of $9,000. Insurance, $1,000.

The core room of the D. M. Osborne & Co.'s shops at Syracuse, N. Y., was destroyed by fire Feb. 22. Loss, $5,000.

Goins & Shank's foundry was burned on the morning of March 11. Building and stock a total loss, as there was no insurance. Incendiarism is suspected.

Fire at the plant of the Gray Iron Casting Co., at Mt. Joy, Pa., caused $30,000 damage. Insurance, $20,000. The firm will immediately rebuild, larger than before.

The Smith-Hill foundry at Quincy, Ill., was damaged $5,00 by fire the latter part of Febraury. The pro rata upon the insurance companies amounted to 35 cents each. They will probably survive.

The foundry of John J. Bowers & Brother, West Twenty-ninth street, New York city, was almost destroyed by fire early in March. Loss, $40,000; insured to full amount.

About $100 damage was done the American Car & Foundry Works, at Madison, Mo., March 17, by fire, which was extinguished by an automatic fire extinguisher, but for which the whole works would probably have been destroyed.

The bursting of an emery wheel in the shops of the Peoria Foundry Co., Peoria, Ill., caused the death of Newton Langley, an employe who had been operating the wheel. A piece of the broken wheel struck him near the jugular vein, breaking his neck.

Persona l.

Wm. H. Bausch, treasurer of the Bausch & Harris Machine Tool Co., Springfield, Mass., returned from Europe, March 2, after a successful business trip.

On March 6, Mr. R. C. Penney resigned the position of general manager of the Union Iron Works, at Bangor, Me., same to take effect April 1. Mr. Penney has held the position of general manager since the consolidation of the Hinckley and Egey Iron Co. with the Bangor Foundry & Machine Co., and was general manager of the former concern before the consolidation. He has made many important improvements to the plant, and now resigns to take a much needed rest. His successor has not yet been appointed. Mr. Penney intends to visit the south and west during his vacation.

Deaths.

R. A. Tilghman of Philadelphia, the inventor of the sand blast, died on March 24.

Henry C. Eyre, founder of the foundry firm of H. C. Eyre & Co., Chester, Pa., died March 13.

Philemon P. Bowles, manager of the Philadelphia branch of the Fairbanks Scale Co., died March 19, at his home in Philadelphia, aged 51 years. He entered the firm's employ in 1876, and since '79 has been the Philadelphia manager.

Edward S. Taber, President of the Morse Twist Drill Co., President of the First National Bank, and one of the leading business men of New Bedford, Mass., died Friday morning, March 10, from pneumonia. He had been ill for a week.

Charles Moulton Mitchell, president of the Bridgeport Brass Co., Bridgeport, Conn., and of the Steele & Johnson Mfg. Co., Waterbury, Conn., died March 9, at his home in Waterbury, aged 77 years.

Thomas H. Hobart, formerly a partner in the Otis Co., Cleveland, O., died at the home of his son-in-law, at East Orange, N. J., on March 4, from erysipelas. He retired from business 14 years ago.

William G. Johnson, president of the Athol Machine Co., Athol, Mass., died March 1, after a long illness. He succeeded his father to large business interests in that city which he had conducted for many years.

Robert Rogers, Sr., a well-konwn foundryman of Belleville, Ill., died March 29 at his home in that city. Mr. Rogers came from Ireland when a boy, and has been in the foundry business in Belleville since 1876. At his death he was 63 years of age.

William H. Read, formerly foreman of the Mason Works foundry, Brockton, Mass., is dead, and was buried Wednesday, March 29. He was a member of Lodge No. 44, I. O. O. F., and Winthrop Lodge No. 116, A. O. U. W., of Brockton. The interment was at New Bedford.

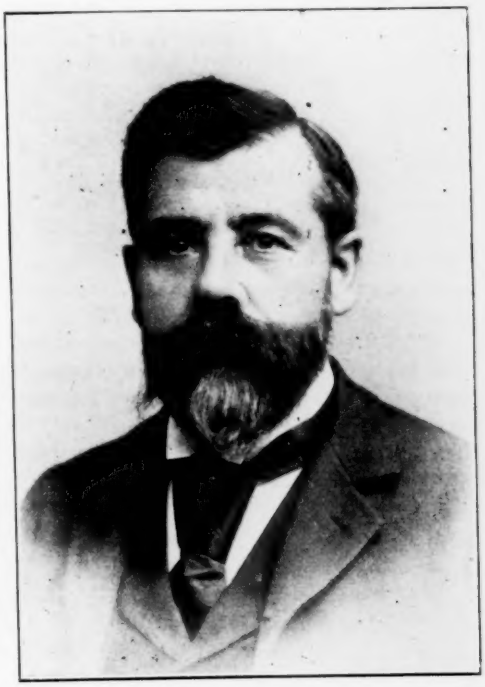
Edwin LeRoy Harrington died at his home in Germantown, Pa., on March 18, of pneumonia, aged 45 years. He was formerly in business with his father, in Philadelphia, under the firm name of Edwin Harrington & Co. For the last eight years he has not been in active business.

Henry Bollinckx, the founder and proprietor of the large power transmission machinery works of Brussels, Belgium, died at his home in Cureghem, Belgium, on March 7. He was born in Brussels March 29, 1826. The plant in Brussels is one of the finest of the type in Europe.

Warren Green, president of the Louisville Car Works, died suddenly on March 20, at the Norton Infirmary, at Louisville, Ky., of pneumonia, aged 46 years. He was the son of the late Norvin Green, president of the Western Union Telegraph Co. Mr. Green was also president of the Louisville Steam Forge Co. He was United States consul at Yokohama, under President Cleveland's first administration.

William B. Middleton, general manager of the Taylor Iron & Steel Co. of High Bridge, N. J., died March 8, after a severe surgical operation for an intestinal trouble, the last of a series of operations extending over a long period. He had been identified with many large manufactories, and became general manager of the Taylor Iron & Steel Co. in June, 1896. Mr. Middleton was 50 years old at his death.

John Kruesi, who died at his home in Schenectady, N. Y., Feb. 22, last, was one of the foremost men in the development of electrical appliances, beginning as an employe of Edison in the early Menlo Park days, and here he made the first phonograph ever made, from crude sketches by Edison. Mr. Kruesi was the inventor of the underground tubing system now in general use. He had been assistant general manager, and at the time of his death, at the age of 56 years, was chief mechanical engineer of the General Electric Company. Mr. Kreusi



JOHN KRUESI.

was, incidentally to his regular business, largely interested in foundry matters, and took a great interest in special features of foundry practice. He was an honest man, loved by all.

Standardized Drillings.

Evidence continues to accumulate as to the importance and of the efficiency of the work of the American Foundrymen's Association Committee on Standardized Drillings. Our readers will see from the following what is thought of this work by people whose competency to judge will not be questioned. We quote extracts from letters received by Mr. West, chairman of the committee:

"We are using standardized drillings for standardizing solutions of sulphur and phosphorus, also for checking other determinations of silicon, graphite, carbon and manganese at our Lucy Furnace plant, and find them very useful in our laboratory. We

think it very necessary that laboratories should be supplied with standardized drillings, especially those working on blast furnace products. L. C. PHIPPS,

"Second Vice-President,

"Carnegie Steel Co., Pittsburg, Pa."

"We are entirely in sympathy with the efforts of your committee, which has our heartiest commendation. * * * We fully appreciate the value of the results which are sure to follow your work, and are very glad to avail ourselves thereof.

"J. C. DAVIS,

"Supt. The Sargent Co., Chicago, Ill."

"I think the method of selling standardized iron samples from a central laboratory, such as the Standardizing Bureau of the American Foundrymen's Association, is one to be commended. The confidence I have in my work after checking with these drillings is very gratifying.

"WALTER M. SAUNDERS,

"Analytical and Consulting Chemist,

"Providence, R. I."

"Yours of the 27th inst., received, and having been referred to our chemist and engineer of tests, he makes the following report: 'In reference to the A. F. A. standards, would say I am pleased with them and take pleasure in indorsing them.'

"WILSON MILLER,

"President Pittsburg Loco. & Car Wks.,

"Pittsburg, Pa."

"We take pleasure in this opportunity to give you a word of encouragement. Trusting you will be successful in interesting all users and makers of pig iron.

"R. HECKSCHER & SONS,

"Swedeland, Pa."

"We take pleasure in saying that our chemist states he has used the standardized drillings in standardizing solutions and found them to be very exact; and adds that too much praise cannot be accorded the standardized drillings you recently sent us.

"ELK RAPIDS IRON CO.,

H. B. Lewis, Pres."

"It is no little comfort to have the standardized samples and to know that the work of our laboratory is correct and reliable.

"EDGAR S. COOK,

Pres. Warwick Iron Co.,

"Pottstown, Pa."

"The thanks of all users of iron and employers of chemists are due your committee.

"FRANK-KNEELAND MACHINE CO.,

"Isaac W. Frank, Pres. and Genl. Mngr."

"The standard samples are a grand idea and the confidence they impart is worth ten times the cost. W. G. SCOTT."

"We do not see how any firm can afford to do without them as they are worth many times their cost.

"SYRACUSE CHILLED PLOW CO.,

"W. W. Wiard, Asst. Sec."

"We are in hearty sympathy with the objects of the committee, and believe that only good will result to manufacturer and consumer alike.

"FRANK TENNEY,

"Asst. Supt. Penn. Steel Co.,

"Shelton, Pa."

"It is the greatest move for improvement in many years.

"ERASTUS C. WHEELER."

"We have checked our routine laboratory work from time to time since receipt of drillings and have found them to be of inestimable value to us.

"KITTANING IRON AND STEEL MNFG. CO.,

"W. L. Scott, Chemist."

"The opportunity which your association offers to obtain in quantity uniform iron samples of definite character, and with statements of the results obtained by experienced analysts must, I am sure, be welcome to every teacher.

"H. P. TALCOTT,

"Mass. Institute of Technology."

"Your plan to systematize this useful work and to carry it out on a larger scale appeals strongly to me, and it is to be hoped that the outcome may be fruitful in benefit both to the makers and to the users of iron.

"THEODORE WM. RICHARDS,

"Chemical Laboratory of Harvard College."

"Permit me to express my belief that this work of your association of distributing carefully analyzed samples of pig iron is of great value to the metallurgists and chemists of this country.

"H. L. MILLS,

"Prof. Analylical Chemistry,

"Sheffield Scientific School of Yale University."

"I believe that every technical school should have a full line of your samples always in stock.

"N. W. LORD,
"Professor of Metallurgy and Mineralogy,
"Ohio State University."

"I have noticed with pleasure your praiseworthy efforts to establish uniformity in pig iron analysis * * * Thanking you for your endeavors to mitigate the perplexities of both the furnace manager and the chemist,

"JOHN P. MARSHALL,
"Supt. Missouri Furnace, Carondelet."

"Occluded Gases."

To the Editor:

I read with profit, Mr. Wickhorst's instructive article on "Porous Castings and Occluded Gases," which appeared in the February issue of THE FOUNDRY, and it afforded me matter for study. But I beg to differ from his conclusions in one particular. I find that when the metal oozes out through the gate and stands on top like beads, the metal is right, and the castings are sound. Our castings have to be machined all over, and we have never had one returned for being spongy.

Our castings are light, weighing from two to three pounds each, and some are still lighter than this. We never use any lead in our phosphor bronze. A phenomenon that we have met with in light, ordinary brass castings, to us inexplicable, we would like to have explained. A casting, about 3-16 in. thick, will sometimes separate at the middle, into plates, exhibiting a very bright yellow, rough surface on the fracture. It appears as if the upper and lower halves of the casting had been somehow pulled apart in the mold while cooling, though the fracture does not appear till after the casting has been machined.

FORTH.

Trade Publications.

We have received from the Joseph Dixon Crucible Company a 5½x6½ 32-page booklet called "Teachers' Note Book." It is full of very entertaining reading consisting of short stories, curious facts, humorous sayings, illustrated tricks, etc., etc., the latter being illustrated dissertations on Dixon graphite pencils.

The B. F. Sturtevant catalogue, No. 96, has reached us. It is a 6x9 book, of 132 pages, describing principally the company's steel-plate fans. These are of all conceivable shapes and sizes, and constructed for many different purposes—forced draught, ventilation, exhaust, etc. The book contains perhaps 200 well-executed illustrations, with full descriptions, and many tables, giving dimensions, powers, etc.

We acknowledge receipt of "Fowler's Mechanical Engineer Pocket Book" for 1899. It is a 4 x 6 well-bound book of about 400 pages, containing the best up-to-date matter appropriate for works of this character. In addition, at the back is a diary for 1899, a calendar, and a number of pages of "diagram forms for graphic records." In the front part of the book is a complete index.

A 5x7 paper covered book with gilt monogram contains the 11th annual report of the Manufacturers' Club, of Philadelphia. Mr. George V. Cresson, President; John Birkinbine and Howard L. Roberts, Vice-Presidents, Wm. T. Tilden, Secretary; Henry Burk, Treasurer. The list of directors consists of 21 names; that of standing committees about 60.

The report is very gratifying in its character. The club is in a flourishing condition, and the prospect for substantial growth and permanency is good.

We have received the Manual of Receipts, compiled by Sidney P. Johnson, and issued by the American Artisan press, Chicago. It is a collection of formulae and processes for artisans, giving the composition of various alloys, amalgams, solders, bronzes, lacquers, varnishes, cements, etc.; also data for the preservation and decoration of various metalic articles. It is neatly bound in cloth, has an index, and contains 240 pages. Many of the receipts and processes are here published in book form for the first time.

The 89th annual report of the Friendly Society of Iron Founders of England, Ireland and Wales is at hand. It is a 6x9 book of 159 pages, with a table of contents. The book is a credit to the society and a cursory perusal of its contents reveals a high standard of intelligence and a conservative sentiment that augurs well for the future of the society's interests. In the "Address to Members," it is stated that recent "demand for our labor is almost if not quite unprecedented in our history." Wages

advanced somewhat in many places during the year 1898. The society afforded aid to kindred societies during the year amounting to £8,838 16s. 8d. During this year the society paid to superanuated members 12,856 pounds; for sick benefits, 8,541 pounds; funerals, 2,457 pounds; accidents, 512 pounds. The total income for the year, in round numbers, was 70,000 pounds; expenditures, 48,000 pounds; leaving a balance on hand, including former balances, of 68,178 pounds.

At the end of the year 1859 the total membership was 13,805, and at the end of 1898 it was 17,295. During a period of 60 years the society has realized an income of 1,841,743 pounds, and has expended 1,773,564 pounds.

NOTICE!

Advertisements in this column, 30 cents a line for each insertion About seven words make a line. The Cash and Copy should be sent to reach us not later than the 20th to insure publication.

Answers addressed to our care will be forwarded.

TO SUBSCRIBERS

whose names appear on our **subscription** list, we will give one free insertion under this heading to those in want of positions, the advertisement to occupy a space of not more than five lines. Additional space or insertions must be paid for in advance at regular rates.

WANTED—A few good molders. Address Keith Furnace Co., Des Moines, Iowa.

WANTED—A pattern-maker. Address The W. K. Henderson Iron Works, Shreveport, La.

WANTED—Foundry foreman; one capable of producing large and small machinery castings at a low rate. Address Box 243, care THE FOUNDRY.

WANTED—A sand blast; new or second-hand, to be used for cleaning hollow-ware and other castings. Address, Box 230, care THE FOUNDRY.

WANTED—Position as foundry foreman; 19 years experience at jobbing and engine work. The South preferred. Address Box 239, Care THE FOUNDRY.

WANTED—An experienced core maker to take charge of core room; good wages to the right man. Apply to Stowell Mfg. & Foundry Co., South Milwaukee, Wis.

WANTED—A position as foreman of foundry; 21 years' experience; green or dry sand, heavy or light. Best of references. Address Box 245, care THE FOUNDRY.

FOR SALE—On account of old age; foundry and machine shop for one-third its value; $3,000 cash and $2,000 on long time. Foundry business was never better. Don't write unless you have the money. Investigate our city. Address, L. D. WILSON, 110 W. 7th street, Des Moines, Iowa.

WANTED—A brass foundry foreman; must be a practical man on general jobbing, able to handle 20 molders; references. Address BRASS, Box 241, care THE FOUNDRY.

WANTED—Position by a practical molder of 20 years' experience on light machinery and jobbing. Would take foremanship in small foundry. Address, Box 225, care THE FOUNDRY.

FOR SALE.—Two second hand foundry jib cranes, 2 and 5 tons capacity, hand cranes, built of wood and iron. Blue print and prices on application. Address, James Leffel & Co., Springfield, Ohio.

WANTED—Foundry foreman capable of handling large and small machinery castings at a low cost; must know how to handle union labor to the best advantage. Address Box 244, care THE FOUNDRY.

WANTED.—Foundry foreman, assistant, a bench molder who has had some experience in molding machines preferred; state fully experience, age and wages expected. Address Box 249, care THE FOUNDRY.

WANTED.—Position as foundry foreman by young married man; large experience, light and heavy machinery, bath tubs, sinks, etc. Well up in economic founding and have had experience in management. Address Box 250, care THE FOUNDRY.

WANTED—Position with some large foundry, as timekeeper, foundry clerk, bookkeeper or shipping clerk, by a young man with 7 years' experience with present employer. Competent and reliable. Address CLERK, Box 222, care THE FOUNDRY.

WANTED—Agencies. Well-known, first-class commission agents, established in Brussels, desire agency for articles likely to have market on the continent. Engineering, electrical, or hardware trade preferred. Best references. Apply to V. H. B., 1899, Iron Age Office.

FOR SALE—At a very low figure, one 48 inch cupola with stack, wind pipes and No. 8 Buffalo blower; one 25 h. p. engine and one 35 h. p. boiler, with steam pipes, pump and all connections. For price and information address STEVENSON & CO., Wellsville, Ohio.

FOR SALE—At a bargain, the following second-hand foundry equipment: One Colliau cupola, melting capacity, four tons per hour, in first-class condition; 1 Colliau cupola, melting capacity, six tons per hour, in fair condition; 1 No. 8 Sturtevant blower, in good condition; 1 No. 10 Sturtevant blower, in good condition; 5, 36x53 inch, double-geared cast iron rumblers; 1, 26x43 inch single-geared cast-iron rumbler. All can be seen at our works, General Electric Co., Schnectady, N. Y.